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RE: OMEGA CHEMICAL CORPORATION – Operable Unit 2
EPA #: CAD042245001
Comment on Proposed Plan for the OU-2 Groundwater Contamination for the Omega Superfund Site and the Omega Superfund Site Remedial Investigation/Feasibility Study

Dear Ms. Deschambault:

This office represents Golden State Water Company (GSWC), and is pleased to submit this comment letter regarding the Omega Superfund Site (Omega Site) on its behalf.

On August 11, 2010, the Untied States Environmental Protection Agency (EPA) issued the Proposed Plan for OU-2 Groundwater Contamination for the Omega Superfund Site (Plan).[1] Shortly after the Plan was made public, on October 16, 2010, the EPA issued the Draft Remedial Investigation (RI) and Feasibility Study (FS) (jointly RI/FS).[2] The 30-day comment period on the Plan was extended to November 22, 2010.[3]

1. <u>Golden State Water Company</u>

(a) General Information

GSWC is a public utility in California and is a wholly owned subsidiary of American States Water Company. It is regulated by the California Public Utilities Commission (CPUC)[4] and the California Department of Health Services (CPDH).[5] The CPUC is an entity established by the California Constitution and is generally responsible, in regard to water, for ensuring that California's investor-owned water utilities deliver clean, safe, and reliable water to their customers at reasonable rates.[6] The California Department of Public Health's (CDPH) Division of Drinking Water and Environmental

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1 http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/6423ed09f825db348825777d005df4d9/$FILE/Omega8_10_PP.pdf

2 http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/84b7c05540db206788257782005d8078!OpenDocument

3 http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/6423ed09f825db348825777d005df4d9/$FILE/Omega%20Extension8_10.pdf

4 http://docs.cpuc.ca.gov/PUBLISHED/GRAPHICS/122633.pdf

5 http://www.cdph.ca.gov/Pages/DEFAULT.aspx

6 http://www.cpuc.ca.gov/NR/rdonlyres/9834890A-FA9F-49C1-9043-FA06BDE45E3D/0/AboutCPUC0410_rev2.pdf

Management (DDWEM) is charged with operation and enforcement of the Drinking Water Program which regulates public water systems; oversees water recycling projects; permits water treatment devices; certifies drinking water treatment and distribution operators; supports and promotes water system security; provides support for improving technical, managerial, and financial capacity; and provides funding opportunities for water system improvements.[7]

GSWC provides water service to 1 out of 37 Californians and is located within 75 communities throughout 10 counties in Northern, Coastal and Southern California (approximately 255,000 customers). In total, GSWC operates 38 community water systems. The GSWC system which overlays some of the site's plume is known as the GSWC Norwalk Water System (Norwalk System).

(b) Service in the Omega Superfund Site Area

The Omega Chemical Corporation facility was located at 12504 and 12512 East Whittier Boulevard in Whittier, California. In January 1999, EPA placed the Omega Site on its National Priorities List.[9] GSWC owns and operates four wells in the Omega Site vicinity which, according to the RI/FS, have been impacted by the contaminants from the Omega Site.[10] These wells and various technical information related thereto were disclosed and discussed in GSWC's Response to the EPA Section 104(e) request.[11] These four well capacities are as follows:

Well Name	2009 Average Pumping Rates (gpm)[8]	Total Acre Feet Pumped in 2009
Pioneer 1	533	625.5
Pioneer 2	381	404.6
Pioneer 3	443	212.0
Dace 1	295	164.5

Each of these wells is, and has been for a considerable period of time, actively employed in supplying water to the communities referenced above.

The subject wells are part of the Norwalk System which serves the areas of Norwalk, Downey, Santa Fe Springs, La Mirada, and some unincorporated areas of Los Angeles County. There are approximately 9,500 water service connections in this system which consist of homes and commercial and industrial locations. In the Norwalk system, there are eight active groundwater wells. These wells supply approximately 65 percent of the system's water needs. The rest of the water is obtained from the Metropolitan Water District. That water, in turn is sourced both from the State Water Project and from the Colorado River, two sources that are under extreme stress.

(c) Background of Omega Site and GSWC Involvement

[7] http://www.cdph.ca.gov/certlic/drinkingwater/Pages/default.aspx
[8] Gallons per minute (gpm).
[9] http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/vwsoalphabetic/Omega+Chemical+Corporation?OpenDocument
[10] RI/FS Pages 2-28 through 2-29, 4-17, 5-34 through 5-38.
[11] Request made March 11, 2010. GSWC does not resubmit said information here. GSWC reminds EPA that such information is to be handled in such a manner that protects the security of the wells and their associated facilities from tampering or destruction.

The EPA has been involved with this site since approximately 1991 when it commenced work with the Department of Toxic Substance Control (DTSC). Because the owner/operator failed to address releases and threats of releases of hazardous substances at the Omega Site, DTSC requested that EPA's Emergency Response Section assess the need for a removal action at the Omega Site. Through this site assessment, EPA determined that a removal action was necessary and issued an Action Memorandum on May 3, 1995. On May 9, 1995, EPA issued a Unilateral Administrative Order (UAO) to approximately 170 major generator potentially responsible parties (PRPs). In January 1999, EPA placed the Omega Site on its National Priorities List. Since that time, EPA has been the lead governmental entity involved in the investigation and remediation of the Omega Site and the contamination emanating there from.[12]

In 2001, EPA began conducting a Fund-lead groundwater investigation in the vicinity of the former Omega Property and in the area downgradient, or generally in a southwest direction from the "Phase 1A" area to beyond the Santa Fe Springs Well No. 1.[13] This downgradient area is called "Operable Unit Two" or "OU2."

A study entitled the "Phase 2 Groundwater Study" was completed by EPA in June 2003. Its specific objectives included:

- ► Determine the nature and extent of groundwater contamination, primarily in areas downgradient of the Omega Chemical Superfund site.
- ► Develop a conceptual model of the hydrogeologic conditions in the OU-02 area. (Page 1-1)

Despite this charge, the GSWC wells were not included in the evaluation and thus any conceptual model relating thereto is clearly lacking.

In and around August of 2005, OU-2 was made public and investigations by EPA leading to the RI/FS began. Information was developed, possible remedies were discussed.[14] At the time of the commencement of the investigation and in the early development of the investigation, GSWC's wells had been in pace and operating for decades. Yet EPA's conceptual and groundwater flow and contaminant level computer model was developed completely ignoring GSWC's wells, the impact of the plume on the wells and their impact on the possible movement of contaminants.

Notwithstanding this omission, the Draft Remedial Investigation (RI) report for OU2 was issued in March 2009. Its stated purpose was to:

> "...evaluate the nature and extent of groundwater contamination and to assess the potential risks posed by this contamination to human health and the environment." (Page 1-1)

EPA's contractor, CH2M-Hill, requested data from GSWC on several of the Norwalk System wells in April 2009, only <u>after</u> the publication of the draft RI. EPA first contacted GSWC in October 2009

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[12] http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/ViewByEPAID/cad042245001?OpenDocument#descr

[13] http://yosemite.epa.gov/R9/SFUND/R9SFDOCW.NSF/db29676ab46e80818825742600743734/00664a6e0727ce278825700705e93f1!OpenDocument

[14] http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/6beec0ddd631e6b18825775900611415/$FILE/Omega%20PPlan%20Aug_05%20152kb.pdf

seeking access to the GSWC wells for testing. That testing was done in December of 2010. It was not until March of 2010 that EPA sought, by way of a 104(e) request, information about GSWC's wells that should have been incorporated into the conceptual and groundwater modeling at least 5 years before that time.

A Draft FS was provided to GSWC several months after the 104(e) information was provided. As noted in the Draft FS it was developed in connection with the following:

> In accordance with CERCLA remedial alternatives must be appropriate to site-specific conditions and protective of human health and the environment. The RI/FS process is the established methodology to develop such alternatives. The RI serves as a mechanism to collect data for site characterization. The FS serves as a mechanism to develop, screen, and evaluate remedial alternatives using the data gathered during the RI. (Page 1-1)

However, it did <u>not</u> meaningfully address the impact of the Omega Site contamination on the GSWC wells. As such, EPA could not truthfully and properly claim it is protecting human health and/or the environment by leaving out of any analysis the subject wells. Further, that Draft FS failed to supply any remedy for the impacts of the contamination from the Omega Site, but merely repetitively concluded, *inter alia*:

- ► The impacted production wells will require continued wellhead treatment because these wells will continue to extract contaminated groundwater;
- ► As the plume moves downgradient toward the wells, the concentrations reaching the GSWC wells are expected to increase over time; and
- ► Should production from these wells decrease or stop, the remedy will actually perform better.

As will be set forth below, the RI/FS documents and the Plan under consideration now are no better, and in some ways far worse then the earlier drafts provided. In essence, EPA is neglecting the impact on GSWC's wells and did not seek information or contact with GSWC about this matter until the RI/FS process was virtually complete. As further noted below, and simply put, EPA has failed to appropriately account for, or deal with the contamination impacting GSWC, and as such, has failed the public it serves.

2. <u>General Comments</u>

(a) Overall Concern

GSWC strongly believes that EPA is, by their decisions, willing to sacrifice the GSWC wells to the contamination from the Omega Site rather then save them from the impact of further contamination in the OU2 plume. These wells, while excluded from OU2, are already intercepting and will continue to intercept the OU2 plume. In fact, as will be noted below, EPA is counting on these wells to continue to capture the contaminants. Further, even if the planned alternative remedial system is put into effect, which is by no means a certainty, it may take considerable time to reverse the impact on the GSWC wells, if reversal will occur at all. In the meantime, the GSWC wells remain unprotected. Further, the potential also strongly exists that such remedial extraction could affect the water available to the GSWC wells thus impeding GSWC's ability to produce water to serve to the community. There is absolutely no analysis in the RI/FS that indicates the possible draw down of the groundwater levels by the selected remedy or if the selected remedy will cause any hydraulic changes in groundwater flow (which is in part its purpose) that will affect water supply to the GSWC wells.

GSWC asserts that not only does the RI/FS not meet the requirements as set forth under the law and EPA's own guidance, but the RI/FS fails to adequately set forth an appropriate analysis and remedy to effectuate a positive environmental effect. As such, the RI/FS should not be employed by EPA as the basis for a remedy.

(b) Whether Interim or Final, the Requirements for an RI/FS are the Same

GSWC has been pleased to have the opportunity to discuss various RI/FS related issues with EPA both at the Public Meeting held on August 31, 2010, a telephone conference call of September 27, 2010,[15] and through emails and informal discussions. As a result of these communications GSWC believes it is important to discuss and frame certain legal issues regarding the Plan and the RI/FS.

It is not disputed that an RI/FS can be performed on the site as a whole, or for a particular portion of the site such as an OU. However, there is <u>no</u> law, rule or regulation, or internal EPA guidance, that suggests there is any different standard to be applied to evaluating the RI/FS in terms of its structure or conclusions whether it be for an OU or the entire site. It is also clear that interim or early actions can be taken throughout the RI/FS process to initiate risk reduction activities.[16] But there is certainly <u>no</u> law, rule or regulation, or internal EPA guidance, suggesting that there is to be any different review of risk reduction when reviewing only a portion of a site, here an OU with improperly drawn boundaries. (Discussed below).

EPA guidance states that during scoping, or at other points in the RI/FS process, EPA may, as was obviously done here, determine that an interim remedial action is appropriate. Reasons permitting such an interim remedy can include the need to:

> ► Take quick action to protect human health and the environment from an imminent threat in the short term, while a final remedial solution is being developed; or
> ► Institute temporary measures to stabilize the site or operable unit and/or prevent further migration of contaminants or further environmental degradation.[17]

As will be discussed herein, not only is there a failure of the RI/FS process in general, but even the selected remedy based on the RI/FS fails to meet these criteria. Furthermore, GSWC, whose wells are impacted by the Omega Site contamination, was not involved in the scoping process, as described below, it was not involved in time to have any meaningful contribution to the RI/FS. In fact, as set forth below, the GSWC wells' very existence were not acknowledged when the OU-2 boundaries were created nor when the investigation of the contamination occurred. It was only a scant few months ago that GSWC was contacted and asked for information so that their wells could be "included" in the analysis.

Certainly of concern here is the failure of EPA to provide for early and continuing consultation with the community in so far as GSWC, not only a community member, but a public utility serving the broader community, is concerned. EPA itself states that

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[15] In attendance on behalf of EPA was Mr. Harrison Carr, Mr. Stephen Berninger, Ms. Lynda Deschambault, Mr. Fred Schauffler. Mr. Tom Perina of CH2MHill, contractor to EPA, was also in attendance.
[16] A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents, EPA 540-R-98-031, OSWER 9200.1-23.P, PB98-963241, July 1999, Page 1-4.
[17] A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents, EPA 540-R-98-031, OSWER 9200.1-23.P, PB98-963241, July 1999, Page 8-2.

> This consultation can elicit useful knowledge about the site (e.g., current and reasonably anticipated future land uses and current and potential beneficial ground-water uses) as well as major public concerns that should be considered.[18]

Whether interim or final, any remedy and its component parts must be followed by a Record of Decision (ROD), which must satisfy all of the following:

- Provide long-term protection of human health and the environment;
- Comply with applicable or relevant and appropriate requirements (ARAR);
- Fully address the principal threats posed by the site or operable unit; and
- Address the statutory preference for treatment that reduces the toxicity, mobility, or volume of wastes.[19]

As set forth herein, the RI/FS fails to meet the necessary required elements and therefore can not be deemed to be an adequate basis for a ROD, or as here is likely to be developed an Interim Record of Decision (IROD).

3. <u>General Requirements for the Selection of an Operable Unit, Plan and RI/FS</u>

(a) Operable Unit Selection

As a core issue, the selection of an OU is a fundamental building block to move forward with the RI/FS process. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) defines an operable unit:

> "Operable unit" means a discrete action that comprises an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial *response manages migration, or eliminates or mitigates a release, threat of a release, or pathway of exposure*. The *cleanup of a site can* be divided into a number of operable units, depending on the complexity of the problems associated with the site. Operable units may address geographical portions of a site, specific site problems, or initial phases of an action, or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of a site.[20] (Emphasis added.)

As will be shown below, OU-2 fails to meet the NCP criteria.

(b) Remedial Investigation Basic Requirements

The primary objectives of the RI are described as follows:

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[18] A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents, EPA 540-R-98-031, OSWER 9200.1-23.P, PB98-963241, July 1999, Page 1-5.
[19] Ibid.
[20] NCP §300.5.

► All significant operable units/source areas must be adequately characterized in order to determine appropriate remedial goals (i.e. type and nature of source(s) of contaminants, cause or mechanism of release, estimated quantity of release(s), and if the release(s) is/are active or inactive). Site characterization activities should be fully integrated with the development and evaluation of alternatives in the Feasibility Study.

► The nature, threat and extent (vertical and horizontal) posed by the hazardous substances and hazardous materials present at the site must be characterized (including the migration mechanisms) for the purpose of and to the extent necessary for developing and evaluating effective remedial alternatives. The chemical and physical properties of the contaminants, their *mobility and persistence in the environment and their important fate and transport mechanisms* should be characterized during the RI. Any human and environmental targets that may be affected by contamination must be identified.

► All data necessary to assess the extent to which releases of hazardous substances at the site pose a threat to human health and the environment must be gathered during the RI. A risk assessment of contaminant impacts on identified target areas must be completed consistent with EPA guidance and policy.

► Data supporting the analysis (and design, if appropriate) of potential response actions should be gathered during the *RI*. *Individual source control/interim remedial measures plans* for identified "hot spots" or source areas of significant contamination should be developed where appropriate.[21]

As will be shown below the RI fails to meet these, and other, criteria as outlined above.

(c) Feasibility Study Basic Requirements

(i) General

Alternatives for remediation are developed by assembling combinations of technologies, and the media to which they would be applied, into alternatives that address contamination on a sitewide basis or for an *identified operable unit*.[22] During the detailed analysis, each alternative is assessed against the evaluation criteria described below:

► Be protective of human health and the environment.
► Attain ARARs.
► Be cost-effective.
► Utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.
► Satisfy the preference for treatment that reduces toxicity, mobility, or volume as a principal element or provide an explanation in the ROD as to why it does not.[23]

(ii) The Nine Specific Criteria

Nine evaluation criteria have been developed to address the CERCLA requirements and considerations listed above, and to address the additional technical and policy considerations that have proven to be

[21] NCP §300.430(d).
[22] Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA Interim Final EPA/540/G-89/004 OSWER Directive 9355.3-01 October 1988, page 4-3.
[23] Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA Interim Final EPA/540/G-89/004 OSWER Directive 9355.3-01 October 1988, page 6-3.

important for selecting among remedial alternatives. These evaluation criteria serve as the basis for conducting the detailed analyses during the FS and for subsequently selecting an appropriate remedial action. The evaluation criteria with the associated statutory considerations are:

- *Overall protection of human health and the environment*

Alternatives shall be assessed to determine whether they can adequately protect human health and the environment, in both the short-and long-term, from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site by eliminating, reducing, or controlling exposures to levels established during development of remediation goals. Overall protection of human health and the environment draws on the assessments of other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs.[24]

As noted in this comment letter the recommended alternative fails to address the issues related to the impact on GSWC's wells. Therefore, it cannot be reasonably stated that the remedy adequately protects human health and the environment, certainly in the short term. The impact on GSWC's public water wells continues unabated and will continue unabated for many years until an appropriate remedy is designed and constructed.

- Compliance with ARARs

The alternatives shall be assessed to determine whether they attain applicable or relevant and appropriate requirements under federal environmental laws and state environmental or facility siting laws.[25] So critical are ARARs that EPA guidance states:

> An alternative that cannot comply with ARARs, or for which a waiver cannot be justified, should be eliminated from consideration for further discussion as a potential alternative in the Proposed Plan or ROD.[26]

As noted in this comment letter, the recommended remedy fails to address key ARARs and the processes required under such ARARs to implement such a remedy.

- Long-term effectiveness and permanence

EPA is required to assess the alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that the alternatives will prove successful.[27]

As noted in this comment letter the recommended alternative fails to address the issues related to the impact on GSWC's wells and therefore it cannot be reasonably stated that the remedy adequately protects human health and the environment, in the long term. The impact on GSWC's public water wells will continue unabated for many years, indeed possibly decades, until an appropriate remedy is designed and constructed.

- Reduction of toxicity, mobility, or volume

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[24] NCP §300.430(e)(9)(iii)(A).
[25] NCP §300.430(e)(9)(iii)(B).
[26] Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA Interim Final EPA/540/G-89/004 OSWER Directive 9355.3-01 October 1988, Page 3-9.
[27] NCP §300.430(e)(9)(iii)(C).

The degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume shall be assessed, including how treatment is used to address the principal threats posed by the site.[28] It is noted by EPA that:

> *A containment remedy does not reduce the toxicity, mobility, or volume* of contaminants through treatment.[29]

As noted in this comment letter, the recommended remedy fails to contain the contamination as it will continue to impact GSWC's wells.

- Short-term effectiveness

The short-term impacts of alternatives shall be assessed considering the following: (1) Short-term risks that might be posed to the community during implementation of an alternative;... (3) Potential environmental impacts of the remedial action and the effectiveness and reliability of mitigative measures during implementation; and (4) Time until protection is achieved.[30]

EPA guidance further defines short-term effectiveness to include the amount of time until the remedy effectively protects human health and the environment at the site. It also includes an evaluation of the adverse effects the remedy may pose to the community, workers, and the environment during implementation.[31]

As noted in this comment letter, the recommended remedy fails to deal at all with the short term risks to the community as it fails to take any action by which the GSWC wells are protected in the short term. In fact, the remedy would allow unabated contamination to occur.

- Implementability

The ease or difficulty of implementing the alternatives shall be assessed by considering the following types of factors as appropriate: (1) Technical feasibility, including technical difficulties and unknowns associated with the construction and operation of a technology, the reliability of the technology, ease of undertaking additional remedial actions, and the ability to monitor the effectiveness of the remedy; (2) Administrative feasibility, including activities needed to coordinate with other offices and agencies and the ability and time required to obtain any necessary approvals and permits from other agencies (for off-site actions).[32] EPA guidance states that:

> In addition, administrative feasibility, which includes activities that need to be coordinated with other offices and agencies (e.g., obtaining *permits for off-site activities or rights-of-way for construction),* should be addressed when analyzing this criterion.[33]

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[28] NCP §300.430(e)(9)(iii)(D).
[29] Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA Interim Final *EPA/540/G-89/004 OSWER Directive 9355.3-01 October 1988, Page 3-9.*
[30] NCP §300.430(e)(9)(iii)(E).
[31] Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA Interim Final EPA/540/G-89/004 OSWER Directive 9355.3-01 October 1988, Page 3-9.
[32] NCP §300.430(e)(9)(iii)(F).
[33] Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA Interim Final EPA/540/G-89/004 OSWER Directive 9355.3-01 October 1988, Page 3-9.

As noted in this comment letter, the recommended remedy fails to demonstrate in any way that the recommended remedy could be implemented at all. In this comment letter we discuss the issues regarding the failure of EPA to meet ARARs and also specifically the ability of the recommended remedy to meet CDPH Policy 97-005.

► Cost

The types of costs that shall be assessed include the following: (1) Capital costs, including both direct and indirect costs; (2) Annual operation and maintenance costs; and (3) Net present value of capital and O&M costs.[34] *No comments are made in relation to this issue at this time.*

► State acceptance

The state concerns that shall be assessed include the following:

...*(2) State comments on* ARARs.[35]

As noted in this comment letter, the recommended remedy fails to meet the ARARs as noted herein.

► Community acceptance

This assessment includes determining which components of the alternatives interested persons in the community support, have reservations about, or oppose.[36]

As noted in this comment letter, the recommended remedy fails to be acceptable to GSWC which represents a large community of many areas that rely on the water from its wells. On behalf of the people that GSWC serves, it is compelled to reject the recommended remedy as inadequate and likely to increase the cost of the communities' potable water.

(iii) <u>Purpose Of The Feasibility Study:</u>

The purpose of the FS is to ensure that appropriate remedial alternatives are developed and evaluated such that relevant information concerning the remedial action options can be presented to allow the selection of the appropriate remedy(ies). The primary objectives of the FS are described as follows:

► To identify and evaluate all appropriate remedial alternatives based on site characterization information obtained during the RI. Remedial action objectives (utilizing results of site-specific risk assessments performed during the RI) and any ARARs should be determined in the FS (if not previously determined in the RI).

► To screen and assemble appropriate technologies into remedial action alternatives. Alternatives shall be developed that protect human health and the environment and meet remedial action objectives for the site.

► To evaluate and refine alternatives based on the nine criteria as described in 40 CFR § 300.430 (e)(9)(iii) of the NCP. Relevant EPA guidance documents should also be utilized in developing and evaluating remedial alternatives.

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[34] NCP §300.430(e)(9)(iii)(G).
[35] NCP §300.430(e)(9)(iii)(H).
[36] Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA Interim Final EPA/540/G-89/004 OSWER Directive 9355.3-01 October 1988, page 6-3 – 6-4; NCP §300.430(e)(9)(iii)(I).

► To recommend the most feasible and effective remedial action for the site based on the nine criteria for evaluating remedial alternatives enumerated in 40 CFR § 300.430(e)(9)(iii) of the NCP.[37]

As noted in this comment letter, the FS does not meet all of these criteria.

(iv) Required Analysis

Once the alternatives have been described and individually assessed against the criteria, a comparative analysis should be conducted to evaluate the relative performance of each alternative in relation to each specific evaluation criterion. The purpose of this comparative analysis is to identify the advantages and disadvantages of each alternative relative to one another so that the key tradeoffs the decision maker must balance can be identified. Overall protection of human health and the environment and compliance with ARARs will generally serve as threshold determinations in that they must be met by any alternative in order for it to be eligible for selection.[38]

As noted in this comment letter, the recommended remedy places expedience over sound analysis and over the protection of human health and the environment in compliance with ARARs.

(v) Cleanup Standards

CERCLA §121 (Cleanup Standards) states a strong statutory preference for remedies that are highly reliable and provide long-term protection. In addition to the requirement for remedies to be both protective of human health and the environment and cost effective, additional remedy selection considerations in §121(b) include:

► A preference for remedial actions that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous substances, pollutants, and contaminants as a principal element.

► The need to assess the use of permanent solutions and alternative treatment technologies or resource recovery technologies and use them to the maximum extent practicable.[39]

As will be shown below, the FS fails to meet the criteria outlined above.

(d) Applicable or Relevant and Appropriate Requirements

Section 121(d)(2)(A) of CERCLA incorporates into law the CERCLA Compliance Policy, which specifies that Superfund remedial actions meet any Federal standards, requirements, criteria, or limitations that

[37] NCP §300.430(e).
[38] Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA Interim Final EPA/540/G-89/004 OSWER Directive 9355.3-01 October 1988, page 6-14.
[39] Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA Interim Final EPA/540/G-89/004 OSWER Directive 9355.3-01 October 1988, page 1-4.

are determined to be ARARs. Also included is the new provision that State ARARs must be met if they are more stringent than Federal requirements.[40]

As noted in this comment letter, the recommended remedy fails to comply with ARARs.

(e) The Plan

EPA guidance requires the Proposed Plan to summarize the overall strategy for remediating the site and describe how the action being considered in the Proposed Plan fits into that overall strategy. If the response is being carried out in operable units, the purpose of each operable unit and their planned sequence should be described. Finally, how the OU or response action addresses source materials constituting principal threats should be identified as well.[41]

As noted in this comment letter, the Plan is ill conceived and violative of CERCLA, the NCP and EPA's own guidance.

4. Analysis of the Omega Site OU2, Plan, RI, and FS

(a) OU2

(i) Lateral Expansion Issues

It is not clear precisely when the OU-2 boundaries were initially set. The first reference to OU2 found in EPA online documents appears to be in a August 2005 Fact Sheet wherein it states that:

> To better handle large site cleanups, EPA often separates the cleanup actions into parts called Operable Units. At the Omega Chemical Superfund site, Operable Unit One (OU-1) includes soil and groundwater contamination on and near the former Omega property. Operable Unit Two (OU-2) includes groundwater contamination that has migrated downgradient (southwest) of OU-1... The EPA is continuing to assess the nature and extent of groundwater contamination within OU-2.[42]

The technical data that apparently supported this decision may have been a June 2003 report by Weston Solutions (Weston Report).[43] The Weston Report was in part based on a review of England-Hargis (1996c), which stated that there are 6 water supply wells within 1.5 miles of the site.[44] The review fails to mention or refer to GSWC wells. This fundamental flaw can not be disregarded and has only been compounded by the RI/FS which states the GSWC wells are impacted by the Omega Site contamination yet utterly fails to include these wells within the OU despite that other impacted groundwater wells, such as SFS-1 (City of Santa Fe Springs Well Number 1) are included.[45]

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[40] Id.
[41] Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA Interim Final *EPA/540/G-89/004 OSWER Directive 9355.3-01 October 1988, Page 3-3.*
[42] http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/6beec0ddd631e6b18825775900611415/$FILE/Omega%20PPlan%20Aug_05%20152kb.pdf
[43] Omega Chemical Superfund Site • Whittier, California Phase 2 Groundwater Characterization Study.
[44] *Supra, page 4-8.*
[45] See RI/FS Pages 2-28 through 2-29, 4-17, 5-34 through 5-38, Figures 1-4, 4-9

While the 2005 Fact Sheet referenced above states that EPA is continuing to assess the nature of the groundwater contamination, it is clear that EPA did not do an adequate job by its failure to include GSWC's wells in any study until January, 2010 as noted above. In fact, when OU-2 was created, the GSWC wells were not even discussed or included in any level of planning. Indeed, it was not until January 2010 that GSWC was even contacted by EPA for access to its wells for testing. Further, as noted above, GSWC did not receive a CERLCA 104(e) request for data until March, 2010.[46]

Notwithstanding this, the RI/FS indicates that the plume of Omega Site comparison was:

> ...estimated based primarily on the analytical results from the July through August 2007 sampling event. Historical concentration data from CPT borings and monitoring wells obtained during Omega investigations and information from other facilities at OU2 were also considered.[47]

It was stated by EPA in the Public Meeting, and noted in the FS[48] that while the 2007 data was used for the modeling, the EPA included the 2010 GSWC data. However, clearly indicating that the OU boundaries were ill conceived, the FS also states:

> The contamination from the former Omega facility and AMK has advanced at an apparent plume expansion rate of at least 540 feet per year (ft/y); this rate is an estimated minimum rate and includes the combined effects of advection, sorption, dispersion, and degradation.[49]

GSWC takes this to mean that the plume dimension and therefore the OU boundaries are in error by about 1500 feet laterally toward the GSWC wells which the FS and the modeling do not incorporate. The key criteria for the designation of an OU is that it must *manage migration, or eliminate or mitigate a release, threat of a release, or pathway of exposure.*[50] Given that laterally the Omega Site contamination clearly is already impacting the GSWC wells, this OU fails to manage migration or eliminate the impact of a release or a pathway of exposure in terms of those contaminants impacting GSWC wells.

In fact, the FS further supports GSWC's assertion that the OU boundaries do not manage migrations in that it notes

> The impacted production wells (SFS1 and four GSWC wells) will require continued wellhead treatment because these wells will continue extracting contaminated groundwater. The contaminant concentrations reaching the GSWC wells are expected to increase over time.[51]

The Plan states that EPA is relying on GSWC to provide continued treatment of its source water which is contaminated by the Omega Site contamination for the protection of human health. It states:

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[46] Results filed in the Administrative Record on March 12, 2010. See http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/cf49ba0eb9415c758825778b0072e1f9!OpenDocument.
[47] FS Page 1-12.
[48] See FS Page 1-10, 1-12, 2-1, Figure 1-4 (showing use of 2007 data).
[49] FS Page 1-15.
[50] NCP § 300.5.
[51] FS Page 4-16.

> All water supply wells known to be impacted by the OU-2 plume have wellhead treatment units that remove the contaminants such as PCE before the water is put into the distribution system, preventing any current exposure via that pathway.[52]

GSWC, as a regulated utility, is required to treat this contaminated water before serving it under both the Federal and California Safe Drinking Water Acts and various rules and regulations established by CDPH and CPUC. This does not excuse EPA from considering that the flow of contamination into the GSWC wells is not a pathway of exposure and for EPA to do so would be contrary to the purposes of CERCLA to remove and remediate contamination in the environment. Yet despite warnings of the possible need for different treatment in the future as stated in the FS itself, the FS thrusts the responsibility for remediation on GSWC.

> The existing wellhead treatment systems at production wells currently use LGAC [liquid phase granular activated carbon] for VOC [volatile organic compound] treatment. It is possible that these treatment systems may need to be augmented with additional treatment processes such as AOP or RO for of other COCs [constituents of concern] in the future. The production wells and their wellhead treatment systems are not part of the alternative; any required modifications would be implemented by the water purveyors.[53]

Particle track simulations presented in the FS show capture by the Pioneer wells. In the no action scenario (Figure A15-3), the Pioneer wells capture the PCE 5ug/l contour within 5 years, a time period that would be reached at year 2012 (5-years from 2007). Impacts exist in all remedial action scenarios as well. As such, this is further evidence that the OU2 boundary has been incorrectly defined.

(ii) <u>Vertical Expansion</u>

The OU is also bounded vertically by a depth of approximately 200 feet as the wells to be installed for the Selected Remedy described in the FS and the Plan would be pumping from that maximum depth. As summarized in the Plan:

> The August 2010 RI/FS for OU-2 found that the contaminated groundwater is present starting at the water table (that occurs at approximately 40 to 100 feet below ground surface (bgs)) and extends down to 200 feet bgs in some places.[54]

Further, the RI notes that:

> The contamination is also *expected to migrate into deeper aquifer zones*, due to vertical gradients at OU2 that are induced by regional production pumping, and artificial and natural recharges. This is *corroborated by the fact that VOCs present in the OU2 plume have* been found in five production wells. Well SFS#1 of the City of Santa

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[52] Plan Page 5.
[53] FS Page 4-16.
[54] Plan Page 3.

> Fe Springs, screened from 200 to 1,000 feet bgs, has been impacted by the Omega Contaminants, and a wellhead treatment system is in place. *Four wells owned by GSWC*—Pioneer 1, Pioneer 2, Pioneer 3, and Dace 1—*have also been impacted* by the Omega Contaminants and wellhead treatment is in place at each well. These wells extract contaminated groundwater from a depth of about 200 feet bgs (this is the depth of the single screens at Pioneer 1 and Pioneer 3, and shallow screens at Pioneer 2 and Dace 1). It is also expected that contamination currently present at OU2 will migrate into deep and yet un-impacted aquifers if no action is taken, based on the deep mixing of meteoric water in this part of the central basin (Reichard, et al., 2003), vertical head differences, and groundwater flow patterns.[55] (Emphasis added).

There is no evidence that the contamination from the site is not, in the area of our wells, already being drawn down to a deeper layer of the aquifer and given the geology of the area and the impact of wells *such as ours and their usual pumping pattern it is highly likely this is occurring. In fact*, the RI states:

> The contamination is also *expected to migrate into deeper aquifer zones*, due to vertical gradients at OU2 that are induced by regional production pumping, and artificial and natural recharges. This is corroborated by the fact that VOCs present in the OU2 plume have been found in five production wells.[56] (Emphasis added).

(iii) <u>Conclusion</u>

Therefore, knowing that there is migration already occurring or highly likely to occur does not provide for a demonstrable showing that the boundaries of the OU were selected properly. Instead, they represent an arbitrary decision made on either incomplete evidence or one purposely made to avoid the need to apply some mitigation now to the GSWC wells currently being impacted not only at the 200 foot level, but at depth.

(b) The Plan

(i) <u>Scope and Role of Operable Unit</u>

EPA guidance requires that this section of the Plan

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[55] RI Page 8-5 ("The contamination is also expected to migrate into deeper aquifer zones, due to vertical gradients at OU2 that are induced by regional production pumping, and artificial and natural recharges").. The Plan reiterates this basic concept: "However, there is the potential for the contaminated ground-water to migrate into deeper and/or uncontaminated downgradient portions of the aquifer and impact production wells that do not have wellhead treatment units." Plan Page 5.

[56] RI Page 8-5.

> ...should summarize the lead agency's overall strategy for remediating the site and describe how the action being considered in the Proposed Plan fits into that overall strategy.[57]

The Plan does not fulfill this requirement. The only commentary in this section of the Plan that discusses the future in any relevant way is the following statement:

> Following implementation of the selected interim remedy for OU-2, EPA will conduct further studies and expects to propose additional remedial actions for the OU-2 plume as part of the final cleanup remedy for the Site.[58]

At the very least, EPA must provide an overall concept of the next steps and how this OU fits in.

(ii) Remedial Action Objectives

The remedial action objectives (RAOs) are to describe what the proposed site cleanup is expected to accomplish.[59] According to the Plan, the following are the RAOs developed for the interim containment remedy for OU-2:

- ► Prevent unacceptable human exposure to COCs in groundwater.
- ► Decrease lateral and vertical spreading of COCs in groundwater at OU-2 to protect current and future uses of groundwater.
- ► Decrease lateral and vertical migration of OU-2 ground-water with high concentrations of COCs into zones with currently lower concentrations of COCs to optimize the efficiency of contaminant mass removal and the treatment of extracted groundwater.

As has been noted above and will be further noted below in reference to discussions about the RI and the FS, the Plan lays out an objective that is not met by the preferred alternative described in the FS. It does not impact in any way the vertical spreading of the COCs currently or in the future as the remediation system is only going to draw from a limited portion of the Omega Site contaminant plume, only down to 200 feet. Further, there are substances in the Omega Site contaminant plume that are currently showing up in GSWC's wells and they are not capable of being treated with the present CDPH approved treatment in place. Therefore, there is a current lateral impact that is not being addressed by the proposed selected alternative. EPA has merely arbitrarily decided to leave the problem of dealing with future Omega Contaminants to GSWC:

> The existing wellhead treatment systems at production wells currently use LGAC for VOC treatment. It is possible that these treatment systems may need to be augmented with additional treatment processes such as AOP or RO for other COCs in the future. The production wells and their wellhead treatment systems are not part of

[57] A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents, EPA 540-R-98-031, OSWER 9200.1-23.P, PB98-963241, July 1999, Page 3-3.
[58] Plan Page 3.
[59] A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents, EPA 540-R-98-031, OSWER 9200.1-23.P, PB98-963241, July 1999, Page 3-4.

> the alternative; any required modifications would be implemented by the water purveyors.[60] (Emphasis added).

As such, the Plan sets forth purported goals not matched by the proposed selected alternative's stated capabilities.

(c) The Remedial Investigation

The purpose of the RI is to collect data necessary to adequately characterize the site for the purpose of developing and evaluating remedial alternatives. The investigation does contain considerable information. However, as noted previously, it was stated by EPA in the Public Meeting, and noted in the FS[61] that while the 2007 data was used for all other inputs into the model, EPA included the 2010 GSWC data but failed to employ the acknowledged lateral movement of the plume of 540 feet per year[62] in its evaluation. Nor did it address at all the vertical nature of the Omega Site contamination previously discussed. It only investigated an OU, improperly bounded, and did so with acknowledgement that the GSWC wells, while impacted by the Omega Site contamination, would be excluded.

This basic failure means that the RI is inadequate because:

► The OU is not adequately characterized. While significant data in the improperly bounded OU has been obtained, the data necessary to assess the extent to which releases of hazardous substances are either absent, or ignored.

► The nature, threat and extent (vertical and horizontal) posed by the hazardous substances and hazardous materials present is not characterized (including the migration mechanisms) for the purpose of and to the extent necessary for developing and evaluating effective remedial alternatives. That is, it fails to acknowledge a present need for a remedy that protects or reduces the contamination level of contamination coming into the GSWC wells which GSWC has to deal with to protect public health.

► EPA states that the GSWC wells have been impacted by the Omega plume, and therefore the conceptual model upon which the RI is based must be revised to place GSWC's wells inside the plume boundaries so that the groundwater flow and transport model can be relied upon to address remedial needs.

As an example of these failings:

1. A contaminant trend in wells such as MW28 which is upgradient of the GSWC Pioneer wells is critical in the time period prior to and during implementation of a remedy. The RI indicates that CH2M-Hill conducts biannual sampling but no data is reported in the RI for data after 2007.

2. EPA collected and analyzed samples from GSWC's wells in February 2010. While this data is described under each contaminant in Section 5.7, each section references a tabulation of this data in Table 5-18. However, Table 5-18 does not include any GSWC data.

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[60] FS, Page 4-16.
[61] See FS Page 1-10, 1-12, 2-1, Figure 1-4 (showing use of 2007 data
[62] FS Page 1-15.

3. Section 5.7.1 that describes the occurrence of PCE reports that the February 2010 sampling of the Pioneer wells resulted in values between 0.6 and 20 ug/l. This clearly indicates that the Omega 5 ug/l plume contour should be extended to include the Pioneer wells.

4. Characterization of the aquifer and contaminant impacts have not been adequately completed in the southern portion of the OU, especially in the vicinity of GSWC's production facilities. Monitoring well and hydropunch investigations targeted first water with depths in the range of 95 to 110 feet below ground surface. Knowing that there are vertical gradients, conduits composed of old ag and oilfield wells, contamination at the same stratigraphic layers as the screens of the GSWC wells in other locations of the plume, it is critical that characterization of the aquifer in the vicinity of the key receptors in the area be performed.

5. Figure 5-15 is a graphical representation of the relative VOC concentrations with the Omega plume at each monitoring point. It should be noted that almost 100% of the impact to the upgradient monitoring well to the GSWC Pioneer plant is 1,4-dioxane. Impacts of 1,4-dioxane were initially reported at the Pioneer wells in 2003. Also, in section 5.7.4 of the RI report, EPA indicates that concentrations observed in the February 2010 sampling event indicate that the dioxane plume likely extends to a depth of 200 feet in this area. MW28 and the Pioneer wells should not be excluded based on this data, but they are. This is yet another reason why it is critical that EPA disclose the monitoring conducted in MW28 over the past three years.

6. Section 4.6 Well Production. EPA indicates that "Active and inactive production wells exist within OU2. Information on the status, construction, and water quality is not readily available for production wells in general." This is incorrect. GSWC has provided data that has not been incorporated into this investigation and is critical to proper remedy selection. It is our understanding that the other primary water purveyors have complied in provided data as well.

(d) Feasibility Study

The purpose of the FS is to ensure that appropriate remedial alternatives are developed and evaluated such that relevant information concerning the remedial action options can be presented to allow the selection of the appropriate remedy. This FS should have weighed and evaluated the questions below to meet the minimum requirements for an FS under the NCP and the EPA's own guidance. It does not:

- ► Analyze all the impacts of the remedy on the GSWC wells, in terms of its short and long term effect on GSWC's ability to pump its wells due to the operation of the remedy's extraction systems (i.e. physical impact on the water resource available, the possibility of an increased cost curve to pump against the cone of depression which will be caused by the remedy well and the correlative impact on energy consumption and GHG production to overcome those physical issues).

- ► Analyze how and in what manner the remedy will impact on GSWC's water rights, the value of those rights and GSWC's ability to site new wells within the basin and thus draw from groundwater sources it has a right to draw from.

- ► Analyze the impact of the contaminate threat to human health and the environment currently and on a continuing basis in terms of EPA stated assertions that the contamination will move to the lower levels of the aquifer, and also the analysis of same in terms of the impact of the remedy on either increasing or lowering that risk. Indeed EPA fails to provide an explanation as to the basis for it stating that the response actions reduce the mobility of chemicals, eliminate exposure pathways, and prevent the migration of contamination in *groundwater into yet unimpacted aquifer zones.*[63]

▶ Analyze how and in what manner the selected remedy satisfies the preference for treatment that reduces toxicity, mobility, or volume as a principal element when it does not stop the contamination from reaching GSWC wells currently and/or it leaves the contamination to be drawn down now into lower portions of the aquifer which will not be remediated by the remedy, only by GSWC.

▶ Analyze the need and impact on GSWC for institutional controls on its pumping so as to serve the community with drinking water and meet its obligations as established by the CPUC. EPA merely acknowledges that water rights holders may "inadvertently operate their production wells (and/or install new wells) in a manner that is incompatible with the containment and human health protection goals of the selected remedy."[64]

▶ Provide a sufficient explanation as to why GSWC is being excluded from the periodic (e.g., annual) meetings among EPA and State and local entities with jurisdiction over well drilling and groundwater use within the Central Basin.

▶ Provide a sufficient explanation concerning the short-term effectiveness criteria as it is clear the selected remedy will not be implemented for a considerable period of time. The issue of short-term effectiveness is an assessment of the status quo which EPA has determined (the no action alternative) is not appropriate.

▶ Provide a sufficient explanation of the actual technical and administrative implementability of the selected remedy in terms of the difficulties and length of time for the CDPH 97-005 analysis which is an acknowledged ARAR.

▶ Provide a sufficient explanation of the selected remedy choice to use a biological process for its treatment of the contamination in terms of its actual technical and administrative implementability so as to meet the regulatory requirements of the CDPH relating to the supply potable water.

▶ Provide a sufficient explanation of the actual technical and administrative implementability of the selected remedy in relation to the ability to dispose of the brine discharge into the sewer system.

▶ Provide for either interim protection of the GSWC wells, or a contingency plan to address the inevitable delays with implementation of the proposed solution, assuming EPA is determined to go forward with it.

(e) ARARs

The FS discusses numerous ARARs that are to be considered in this project. Many are discussed above and will not be repeated. However, there are several that need to be addressed more fully.

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[63] FS Page 2-19.
[64] FS Page 3-2.

(i) CDPH

(1) Authority

One of EPA's criterion for evaluating an alternative is "State Agency Acceptance." EPA stated that they had State Agency acceptance because DTSC supported the preferred alternative. However, virtually no mention is made of the critical role of the CDPH that must support the preferred alternative since the treated water is to be used for drinking water. It does not appear that EPA gained CDPH's acceptance of the alternative, or even had substantive discussions with CDPH while deciding upon the preferred alternative. Of particular concern is the proposed biological granular activated carbon (GAC) treatment. CDPH normally requires surface water treatment following this treatment process, which is not included in EPA's proposed remedy.

Also, the proposed remedy aims to reduce 1,4-dioxane to 2 parts per billion (ppb) in order to comply with the current CDPH notification level (NL) of 3 ppb. The NL was based on EPA's risk level of one in a million cancer risk. However, EPA recently lowered the risk level to 0.35 ppb, which could prompt CDPH to correspondingly lower the NL. EPA needs to evaluate this as part of the feasibility study through consultation with CDPH.

Lastly EPA states that Chromium VI does not need to be reduced during the initial 15-year treatment period because levels currently meet the drinking water standard of 50 ppb for total chromium. As EPA full well knows, the Office of Environmental Health Hazard Assessment (OEHHA) has proposed a Public Health Goal (PHG) of 0.06 ppb for Chromium VI. Establishment of a PHG is the precursor for developing a California drinking water standard. If the Chromium VI PHG is finalized at 0.06 ppb, this could lead to CDPH setting a drinking water standard for Chromium VI much lower that the current total chromium standard. EPA should take this into account when evaluating the proposed remedy, even as a contingency, which it does not.

(2) CDPH Policy 97-005

CDPH defines an extremely impaired source as one that meets one or more of the following criteria:

- exceeds 10 times an MCL or action level (AL) based on chronic health effects;
- exceeds 3 times an MCL or AL based on acute health effects;
- is extremely threatened with contamination due to proximity to known contaminating Activities;
- contains a mixture of contaminants of health concern;
- is designed to intercept known contaminants of health concern.[65]

OU-2, even with its incorrectly drawn boundaries, squarely meets the criteria of an extremely impaired source. Such sources should not be considered for direct human consumption where alternatives are available. To successfully meet the criteria set forth in 97-005, a party must meet various burdens and supply information sufficient to overcome the basic concept that the water should not be used.[66]

[65] http://www.cdph.ca.gov/certlic/drinkingwater/Documents/DWdocuments/memo97-005.pdf
[66] http://www.cdph.ca.gov/certlic/drinkingwater/Documents/DWdocuments/memo97-005.pdf

All practitioners, legal and engineering, in the State of California familiar with the requirements of 97-005 will state unequivocally that CDPH takes this analysis very seriously and is very thorough in its analysis. As such, these analyses are costly and take considerable time.

There is no indication in the record of EPA's contact or communication with CDPH on this critical ARAR and the transcript of the public hearing on August 31, 2010 would show that EPA has not even taken anything beyond what charitably may be described as rudimentary first steps in discussing 97-005 with CDPH. The lack of action by EPA and attention to this critical agency is, frankly, deplorable given that EPA wishes to employ a remedy that relies on the use of treated groundwater for potable water usage.

(3) Treatment Methods

Under California Health & Safety Code § 116720 et seq, the CDPH is vested with certain responsibilities. These include the development and approval of new "methods of treating raw water to prepare it for drinking, so as to improve the efficiency of water treatment and to remove or reduce contaminants." Health & Safety Code § 116350. Health & Safety Code §116365 requires CDPH to determine the primary drinking water standards by taking into account several things. It states:

> Each primary drinking water standard adopted by the department shall be set at a level that is as close as feasible to the corresponding public health goal placing primary emphasis on the protection of public health, and that, to the extent technologically and economically feasible, meets all of the following: (b)(3) The technological and economic feasibility of compliance with the proposed primary drinking water standard. For the purposes of determining economic feasibility pursuant to this paragraph, the department shall consider the costs of compliance to public water systems, customers, and other affected parties with the proposed primary drinking water standard, including the cost per customer and aggregate cost of compliance, using best available technology. (Health & Safety Code § 116365).

Health & Safety Code § 116370 discusses the current assessment and methods of assessment for determining the best available technology for contaminants as required by Health & Safety Code § 11635. This requires CDPH to hold a public hearing and adopt a finding of the best available technology for *each contaminant for which a primary drinking water standard has been adopted. In* doing so, the CDPH shall take into consideration the costs and benefits of best available treatment technology that has been proven effective under full-scale field applications.

This requirement is not discussed or built into the FS, the Plan and certainly is a major impediment to the selected remedy coming on line.

(ii) <u>State Water Resources Control Board</u>

The State Water Resources Control Board (State Board) is barely mentioned in the RI/FS yet its various regulations and policies are ARARs that should have been taken into account.

(1) Resolution 68-16

The expression of the anti-degradation policy of the State Board is clear. The policy states:

> Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

Neither the FS, nor the Plan, discusses the impact of this resolution in regards to the continuing contamination of the groundwater and the impact on GSWC's wells.

(2) Resolution 92-49

Resolution 92-49 supports Resolution 68-16 and provides guidance on how to meet California's non-degradation policy when there are issues with technology and cost. In general, an anti-degradation analysis is required to be performed to support all regulatory actions that, in the Regional Board's judgment, will result in a significant increase in pollutant loadings. The Regional Board must consider anti-degradation effects and conduct an anti-degradation analysis when the proposed activity results in:

- ► A substantial increase in mass emissions of a pollutant, even if there is no other indication, that the receiving waters are polluted; or
- ► Mortality or significant growth or reproductive impairment of resident/species.

In particular, an anti-degradation finding should be made and, if necessary, an analysis should be conducted when performing the following permit activities:

- ► Issuance of a permit for any new discharge, including Section 401 certifications; or
- ► Material and substantial alterations to the permitted facility, such as relocation of an existing discharge; or
- ► Reassurance or modification of permits which would allow a significant increase in the concentration or mass emission of any pollutant in the discharge.

To perform such an analysis, the Regional Board is required to review certain specific issue and reach conclusions based solely on the result of the review. These include:

- ► Comparison of the receiving water quality to the water quality objectives established to protect designated beneficial use;
- ► A balancing of the proposed action against the public interest so that it can ensure a discharge to high quality water, which is likely to reduce water quality, unless the reduction in water quality is offset by maximum public benefit to the people of the State.

In carrying out these requirements the Regional Board must:

> "A. Concur with any investigative and cleanup and abatement proposal which the discharger demonstrates and the Regional Water Board

> finds to have a substantial likelihood to achieve compliance, within a reasonable time frame, with cleanup goals and objectives that implement the applicable Water Quality Control Plans and Policies adopted by the State Water Board and Regional Water Boards, and which implement permanent cleanup and abatement solutions which do not require ongoing maintenance, wherever feasible;
>
> B. Consider whether the burden, including costs, of reports required of the discharger during the investigation and cleanup and abatement of a discharge bears a reasonable relationship to the need for the reports and the benefits to be obtained from the reports;
>
> C. Require the discharger to consider the effectiveness, feasibility, and relative costs of applicable alternative methods for investigation, and cleanup and abatement. Such comparison may rely on previous analysis of analogous sites, and shall include supporting rationale for the selected methods;
>
> D. Ensure that the discharger is aware of and considers techniques which provide a cost-effective basis for initial assessment of a discharge."

Further, the Regional Board must:

> "G. Ensure that dischargers are required to clean up and abate the effects of discharges in a manner that promotes attainment of either background water quality, or the best water quality which is reasonable if background levels of water quality cannot be restored, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible; in approving any alternative cleanup levels less stringent than background, apply Section 2550.4 of Chapter 15, or, for cleanup and abatement associated with underground storage tanks, apply Section 2725 of Chapter 16, provided that the Regional Water Board considers the conditions set forth in Section 2550.4 of Chapter 15 in setting alternative cleanup levels pursuant to Section 2725 of Chapter 16; any such alternative cleanup level shall:
>
> 1. Be consistent with maximum benefit to the people of the state;
>
> 2. Not unreasonably affect present and anticipated beneficial use of such water; and
>
> 3. Not result in water quality less than that prescribed in the Water Quality Control Plans and Policies adopted by the State and Regional Water Boards..."

Neither the FS, nor the Plan, discusses the impact of this resolution in regards to the continuing contamination of the groundwater and the impact on GSWC's wells.

(iii) <u>Regional Water Quality Control Board Los Angeles Region</u>

The Regional Water Quality Control Board Los Angeles Region has regulatory authority over the discharge of brine to an ocean outfall. While EPA assumes the brine can be put into the sewer (and there is also no indication of the fact that the local sanitation district would permit same) there is no indication that the brine discharged could be disposed of through an ocean brine line.

(iv) CPUC

The most conspicuously absent ARAR relates to the rules, regulations, and other requirements set forth by the CPUC which regulates GSWC. As there is an admitted impact on the GSWC wells from the Omega Site contamination which impacts both humans and the environment, future impacts to other portions of the aquifer from which the GSWC wells draw water, and the future impacts of contaminants from the Omega Site that GSWC is not treating for, to ignore the CPUC is improper.

The CPUC is a state agency of constitutional origin with far-reaching duties, functions and powers. Cal. Const., art. XII, §§ 1-6. The Constitution confers broad authority on the CPUC to regulate utilities, including the power to fix rates, establish rules, hold various types of hearings, award reparation, and establish its own procedures. Id., §§ 2, 4, 6.

In addition to those powers expressly conferred on the CPUC, the California Constitution confers broad authority on the Legislature to regulate public utilities and to delegate regulatory functions to the CPUC. Cal. Const., art. XII, §§ 3, 5. Consistent with these constitutional mandates, the Legislature has granted the CPUC comprehensive jurisdiction to regulate the operation and safety of public utilities. Id., §§ 701, 761, 768, 770, subd. (a). Section 701 authorizes the CPUC to "supervise and regulate every public utility in the State and [to] do all things ... which are necessary and convenient in the exercise of such power and jurisdiction." Section 702 commands every public utility to obey the CPUC's orders, decisions, directions, or rules "in any way relating to or affecting its business as a public utility...."

From 1912 to 1956, the CPUC exercised its public health and safety authority over public utility water service on a case-by-case basis; it examined water quality issues and, where necessary, required water utilities to take specific actions to ensure safe drinking water and authorized rate recovery for the associated costs. Cal.P.U.C. Dec. No. 99-06-054, supra, 1999 Cal.P.U.C. Lexis 312 at pp. 30, fn. 18, 38. On its own motion in 1955, the CPUC initiated a comprehensive investigation to establish "uniform service standards and service rules applicable to all privately-owned, public utility water companies in the State of California." Re. Adoption of Service Standards and Service Rules for Water Utilities (1956) 55 Cal.P.U.C. 56. The proceeding resulted in the adoption of general order No. 103, which established uniform standards of water quality service for regulated utilities, including specific requirements for the source of water, operation of the water supply system, and water testing requirements. Ibid.

General order No. 103, which has been amended during the intervening years, presently provides that "'[a]ny utility serving water for human consumption or for domestic uses shall provide water that is whole-some, potable, in no way harmful or dangerous to health and, insofar as practicable, free from objectionable odors, taste, color, and turbidity.'" Cited by CPUC. Dec. No. 99-06-054, supra, 1999 Cal.P.U.C. Lexis 312 at pp. 39-40. It requires each utility to comply with the water quality standards of the CDPH and EPA and states that compliance with DHS regulations constitutes compliance with the CPUC's rules "'except as otherwise ordered by the commission.'" Id., 1999 CPUC. Lexis 312 at p. 40. Although general order No. 103 has been amended during the intervening years, the policy of requiring wholesome, potable, and healthful water and of adopting the DPH health standards has remained the same since its inception. Cal.P.U.C. Dec. No. 99-06-054, supra, 1999 Cal.P.U.C. Lexis 312 at pp. 39-40.

In discussing these issues, the California Supreme Court noted:

> Plaintiffs argue that the DHS and the EPA have exclusive authority to set standards and enforce laws related to the state and federal SDWA's and that the regulation of water quality is the function of the DHS, not the PUC. Plaintiffs are correct that the Legislature has vested in DHS primary responsibility for the administration of the safe drinking water laws. (Health & Saf.Code, § 116325.) However, they are incorrect in asserting that the PUC has no authority to set and enforce drinking water standards when regulating water providers. The Legislature has vested the PUC with general and specific powers to ensure the health, safety, and availability of the public's drinking water. *Hartwell v. Superior Court* (2002) 27 Cal.4th 256, 270.

The Court further noted:

> Article X, section 5 of the California Constitution states: "The use of all water now appropriated, or that may hereafter be appropriated, for sale, rental, or distribution, is hereby declared to be a public use, and subject to the regulation and control of the State, in the manner to be prescribed by law." Article XII, section 3 of the California Constitution provides that "Private corporations and persons that own, operate, control, or manage a line, plant, or system for ... the production, generation, transmission, or furnishing of ... water ... directly or indirectly to or for the public ... are public utilities subject to control by the Legislature." Such public utilities are thereby subject to regulation by the PUC. (Cal. Const, art. XII, § 5; Pub. Util. Code, §§ 701, 761, 770, 2701.) In regulating utilities, the PUC is authorized to "do all things ... which are necessary and convenient in the exercise of [its] power and jurisdiction" (§ 701) and required to ensure that the service and equipment of any public utility protect the public health and safety. (§§ 451,FN7 768) *Hartwell,* supra at 270-271

Lastly, the Court stated that:

> The PUC's most obvious regulatory authority includes the regulation of rates: "Access to an adequate supply of healthful water is a basic necessity of human life, and shall be made available to all residents of California at an affordable cost." (§ 739.8, subd. (a).) In addition, section 770 addresses water quality regulation and provides in pertinent part: "The commission may after hearing: [¶] ... [¶] (b) Ascertain and fix adequate and serviceable standards for the measurement of ... quality ... or other condition pertaining to the supply of the product, commodity, or service furnished or rendered by any such public utility. No standard of the commission applicable to any water corporation shall be inconsistent with the regulations and standards of the State Department of Health pursuant to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code." *Hartwell,* supra at 271.

Therefore, it is clear that as a Constitutional agency and having some, but not all, overlapping jurisdiction over the service of water and the impact of quality on the service, the CPUC must be considered by EPA as an ARAR. Neither the FS, nor the Plan, discusses CPUC's role in any way.

5. Supporting Technical Analysis

The Water Replenishment District of Southern California (WRD) retained Worley Parsons (WP) to perform a technical analysis on various aspects of the data and conclusions set forth in the RI/FS (WP Analysis).[67] A copy of the report is attached as Appendix A. GSWC believes the analysis contains several comments that directly support the concerns raised by GSWC herein. We highlight these comments below.

(a) OU-2 Boundaries

GSWC has asserted herein that the boundaries for the OU are set improperly and do not take into account the data and fact showing the impact on GSWC's wells. The WP Analysis supports the GSWC position:

> ... none of the plume maps in the RI Report show the OU2 plume(s) extending to the location of the GSWC Pioneer or Dace 1 wells (the maps do not even include the GSWC well locations on them), presumably because of the absence of a shallow groundwater plume in these locations. There is no compelling reason why a plume in shallow groundwater is required to overlie a deeper plume, as suggested by USEPA to rationalize that the OU2 plume does not extend to the locations of the GSWC Pioneer and Dace 1 wells.[68]
>
> The evidence is unequivocal ...that the GSWC Pioneer and Dace 1 wells were impacted by the OU2 plume at levels greater than the MCL during the time period considered by the RI Report. The plume outline for PCE that are shown in RI Report Figure 1-4 as dashed and characterized as "*potential deep (about 00 feet below ground surface) PCE extent*" should be simply drawn as part of the composite PCE plume outline. Presumably, the same comment also applies to the TCE composite plume. Moreover, downgradient delineation of the deeper zone plume may extend beyond these GSWC wells, and the plume outlines in the RI Report should reflect this uncertainty in the downgradient delineation of the OU2 plumes.[69]
>
> There is strong evidence to indicate that the GSWC Pioneer wells, and probably the Dace 1 well, have been impacted by contaminants from the Omega Site, and are therefore presently within the limits of the Omega plume, which is only considered as a "potential" by USEPA.[70]
>
> While the proposed remedial alternatives appear suitable to capture the OU2 plume in the upper aquifer zone, none of the remedial alternatives considered in the FS Report will, or are intended to, control vertical or lateral migration over the entire OU2 plume in the middle and lower portions of the aquifer zone where contamination is observed. In fact, all of the alternatives rely on downgradient

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[67] Dated October 7, 2010.
[68] WP Analysis, page 4-5.
[69] WP Analysis, page 10.
[70] WP Analysis, page 11.

> production wells, particularly the GSWC Pioneer and possibly Dace 1 wells to intercept the OU2 plume in the middle and lower portions of the contaminated zones.[71]
>
> The capture zone modeling indicates that very few particles escape capture by either the extraction wells or production wells, suggesting that either the leading edge or plume wide extraction alternative (including GSWC production wells) should be able to capture the entire OU2 plume.[72]
>
> ...while in the two dimensional (plan) view, the proposed remedial alternative appears effective in capturing the entire OU2 plume, but there is a very great risk that a deeper portion of the plume (below 200 ft depth) could bypass the remedial extraction wells and pose an ongoing threat to farther downgradient wells, such as the GSWC Imperial wells (which may already be seeing some leading-edge *contamination from the OU2 plume).*[73]

Aside from the facts and data showing that the Omega Site contamination is impacting the GSWC wells, the fact that the RI/FS does not address any remedial action relating to this potential impact on public health and the environment is a critical deficiency in the work performed. Also, as the RI/FS asserts that GSWC's wells have been impacted by the Omega Site contamination, this fact points to a major flaw with the design of the conceptual model which has therefore impacted all decisions based on, or allegedly supported by the groundwater flow and transport model, including the very outline of the OU.

(b) Vertical Expansion of the Omega Contamination

The WP Analysis notes:

> The vertical extent of contamination in the RI Report is likely under-represented (i.e., greater) in the downgradient part of OU2...There are two key lines of evidence that indicate that contamination is likely *deeper than indicated in the RI Report, as follows:*
>
> OU2 is located in a regional recharge area dominated by downward vertical hydraulic gradients, indicating a downward component of groundwater flow. As noted in RI Report Section 4.5.2.4 (p. 4-7), "The greatest difference between water levels in adjacent screens is 25.69 feet between Wells MW25C and MW25D. Water level differences of 10 to 20 feet were measured at six locations (or wells)—between OW3 and OW3B, OW8 and OW8B, MW17B and MW17C, MW20B and MW20C, MW26B and MW26C, and MW27B and MW27C".
>
> The second line of evidence that indicates that contamination is likely deeper than indicated in the RI Report pertains to stratigraphy. The PCE plume at well cluster MW27 extends to well MW27C, which is

[71] WP Analysis, page 17.
[72] WP Analysis, page 18.
[73] WP Analysis, page 20.

> completed in stratigraphic unit 4. As shown in cross section C-C', stratigraphic unit 4 dips in the downgradient direction, such that at the location of MW29 the base on this unit is approximately 270 feet deep. Even considering only the horizontal component of groundwater flow in this unit, it is likely that the plume will extend to depths appreciably greater than 200 feet between MW27 and MW29.[74]

As GSWC has noted, above, there is not only evidence in the RI/FS that its wells are subject to the impact from contamination at lower levels of the aquifer, but that there is a logical scientific basis to support the claim that the RI/FS does not appropriately take the reality of the risk into account as is required by law and guidance. As noted in the WP Analysis:

> The USEPA conceptual model appears to be predicated on the concept that contamination that enters the water table at the Omega site will subsequently migrate in shallow groundwater near the water table for the entire length of the plume, while recognizing that downward vertical migration will occur simultaneously. The USEPA conceptual model does not recognize the concept of a plunging plume, which is very commonly observed at contaminated sites. In a system with significant downward vertical components of flow, areal recharge of 1.5 to 2 inches per year (as quoted in the RI Report based on USGS work), there is no driving force to maintain the plume at shallow depths, in the absence of additional downgradient sources of contamination. Consequently, it is reasonable to expect the downgradient plume to gradually dive below the water table and into deeper groundwater.[75]

The WP analysis clearly demonstrates that investigation of depths greater than 200 feet bgs were necessary to fully delineate the vertical and lateral extent of contamination, especially at the furthest down gradient portion or southern end of the OU-2 plume where GSWC's wells exist. As we have outlined, one of the goals of the FS claimed remediation efforts is to prevent vertical migration and spreading of the OU-2 plume. Confirmation of the vertical contamination extent is critical when designing even an interim remediation solution and without such information, there can be no basis for support for the selected remedy.

(c) The Remedy Selected in the FS

GSWC has asserted herein the remedy is not adequate to address the impact of the Omega contamination on the site let alone on GSWC wells. The WP Analysis comments:

> While the proposed remedial alternatives appear suitable to capture the OU2 plume in the upper aquifer zone, none of the remedial alternatives considered in the FS Report will, or are intended to, control vertical or lateral migration over the entire OU2 plume in the middle and lower portions of the aquifer zone where contamination is observed. In fact, all of the alternatives rely on downgradient

[74] WP Analysis, page 2-4.
[75] WP Analysis, page 4.

> production wells, particularly the GSWC Pioneer and possibly Dace1 wells to intercept the OU2 plume in the middle and lower portions of the contaminated zones. The FS Report does not define these "middle" and "lower" aquifer zones in terms of stratigraphic units, model layers, or depth intervals; however, the FS assumes that plume is limited to 200 feet depth, so presumably the upper, middle and lower portion of the aquifer zones reside between the water table and this depth.[76]
>
> Capture zone modeling conducted for the FS shows that approximately one-third of the OU2 plume in the middle and lower portion of the contaminated zone will continue to be captured by the downgradient GSWC wells. FS Report Figures A-13 and A-14 show the capture zones for the leading edge and plume-wide pumping alternatives, respectively including GSWC wells Pioneer 1 (3S/11W-07E01S), Pioneer 2 (3S/11W-07E02S), and Dace 1 (3S/11W-18G05S). Under both alternatives, these figures show that these three wells will continue to capture the western one-third of the OU2 plume in the middle and lower portion of the contaminated zone.[77]
>
> The proposed remedial alternative, including ongoing extraction from the GSWC Pioneer and Dace 1 production wells is likely to prevent further downgradient migration of the OU2 plume in the groundwater interval up to 200 feet depth. However, as noted previously, there may be significant problems with the USEPA conceptual model in terms of plume depth, particularly in the downgradient portion of the plume (for example, where the proposed leading edge extraction wells are located). The proposed depth of extraction wells in downgradient areas is based on the assumption that the plume is limited to 200 feet depth. However there are no data from this depth (or deeper) and no vertical delineation of the plume in the downgradient areas of concern. Consequently, while in the two dimensional (plan) view, the proposed remedial alternative appears effective in capturing the entire OU2 plume, but there is a very great risk that a deeper portion of the plume (below 200 ft depth) could bypass the remedial extraction wells and pose an ongoing threat to farther downgradient wells, such as the GSWC Imperial wells (which may already be seeing some leading-edge contamination from the OU2 plume).[78]

In other words, while EPA denies the claim that the GSWC wells are part of the remedy, they clearly are and EPA has avoided addressing this important issue by declaring that the wells are not suitable for this purpose. If they are not suitable, why then is EPA relying on them? This is a contradiction that demands a resolution and a solution now.

6. <u>Conclusion</u>

For all the reasons set forth herein, GSWC concludes it would be in the best interests of the subject community, the environment, and the people directly served by GSWC for the following to occur:

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[76] WP Analysis, page 10.
[77] WP Analysis, page 10.
[78] WP Analysis, page 21.

A. Reconsider and readjust the OU boundaries to include all impacted public water supply wells, including those of GSWC.

B. Reconsider the remedy selection so that it assesses the impact of the operation of its remedy on public water supply wells, including those of GSWC.

C. Reconsider the remedy selection so that it properly assesses the operation of the remedy on water rights of public water suppliers, including those of GSWC.

D. Reconsider the remedy selection so that it properly assesses the operation of the remedy on future water production for the community through public water supply wells.

E. Immediately begin discussions in earnest with the CDPH on the variety of issues of their needed approval under their policy 97-005 and their acceptance of the treatment system proposed.

F. Recognize the CPUC as an appropriate ARAR.

G. Redraft as necessary the RI and FS to appropriately meet the concerns GSWC has discussed herein so as to meet all required and necessary elements for such reports.

Very truly yours,

Steven L. Hoch
Brownstein Hyatt Farber Schreck, LLP

Attachment
Appendix A: Water Replenishment District of Southern California – Worley Parsons Report

cc: Mr. Stephen Berninger
Dr. David Chang
Dr. Toby Moore

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7 October 2010

Proj. No.: 308006-223-T5
File Loc.: Long Beach

Water Replenishment District of Southern California
4040 Paramount Blvd.
Lakewood, CA 90712

Attention: Phuong Ly

Dear Ms. Ly:

RE: TECHNICAL MEMORANDUM
OMEGA CHEMICAL SUPERFUND SITE, WHITTIER, CALIFORNIA

WorleyParsons was retained by the Water Replenishment District of Southern California (WRD) to support its efforts in addressing questions developed by WRD in response to the Remedial Investigation and Remedial Feasibility studies for the Omega Chemical Corporation Superfund Site (Omega Site), Operable Unit 2 (OU2), by the United States Environmental Protection Agency (USEPA).

Documents Provided by the WRD

The principal documents that were reviewed in addressing the questions provided were:

a) Remedial Investigation/Feasibility Study Reports, Omega Chemical Corporation Superfund Site, Operable Unit 2, Volume 1, by CH2M Hill for USEPA, August 2010. (the RI Report)

b) Final Feasibility Study Report, Omega Chemical Corporation Superfund Site, Operable Unit 2, Whittier, California, by CH2M Hill for USEPA, August 2010. (the FS Report)

c) Proposed Plan for OU-2 Groundwater Contamination, Omega Chemical Corporation Superfund Site, by USEPA, August 2010. (the Proposed Plan)

In addition, historical groundwater quality data was provided for the following Golden State Water Company (GSWC) production wells:

- Pioneer 1, 2, 3
- Dace 1
- Imperial 1, 2, 3

Laboratory analytical reports for the USEPA's February 2010 sampling of the Pioneer 1, 2, and 3 wells and the Dace 1 well were also provided.

Response to Questions Developed by the WRD

In the remainder of this document, the questions provided to WorleyParsons by WRD are shown in bold text. The WorleyParsons response follows each question. For reader convenience, cited figures from the RI Report and the FS Report are included in Attachment A and Attachment B of this document, respectively.

Question 1. Do you agree with the conceptual model developed by USEPA on the hydrogeological conditions and plume configuration of the OU-2 area, particularly with respect to the locations and total depths of the monitoring wells installed for the RI/FS? Discuss the weaknesses, if any.

The key elements of the USEPA conceptual model (RI Report, Section 6) for OU2 of the Omega Site include the following:

- Known total depth extent of contaminants is approximately 200 feet in the OU2 area; and the depth of contamination increases downgradient of the Omega Site;
- The contamination found at GSWC Wells Pioneer 1, Pioneer 2, Pioneer 3, and Dace 1 likely extends to their upper screen intervals centered at about 200 feet bgs; however, VOC contamination was not found in the shallow groundwater (near the water table) in this area;
- The rate of Tetrachloroethene (PCE) and Trichloroethene (TCE) degradation is slow compared to their migration rate, and therefore they occur in groundwater throughout the OU, as does 1,4 dioxane, which doesn't readily degrade;
- 1,1,1-Trichloroethane (1,1,1-TCA), PCE, and TCE degradation byproducts occur throughout the OU; PCE and TCE degradation occurs primarily at the source areas and not further downgradient;
- Advective transport velocity, including sorption, is most likely 620 feet per year; however, advective velocities several times higher are possible;
- Numerical modeling supports the conceptual model and shows that the plume from the Omega Site has comingled with the Angeles Chemical – McKesson (AMK) sites located 1.3 miles downgradient (11 years travel time);
- Shallow groundwater contamination has the potential to impact deep aquifers in the Central Basin due to the drawdown of deep aquifer groundwater levels due to pumping, and the evidence of meteoric water mixing with deep groundwater in the Central Basin

The following comments address key elements assumptions of the USEPA conceptual model.

The vertical extent of contamination in the RI Report is likely under-represented (i.e., greater) in the downgradient part of OU2. The furthest downgradient monitoring well cluster with vertical delineation of the PCE or TCE plume is MW27; downgradient (south) of that well cluster, there is no vertical delineation of the plume. Figure 4-8 of the RI Report, cross-section C-C', shows the absence of vertical delineation between MW27 and MW29. There are two key lines of evidence that indicate that contamination is likely deeper than indicated in the RI Report, as follows:

a) OU2 is located in a regional recharge area dominated by downward vertical hydraulic gradients, indicating a downward component of groundwater flow. As noted in RI Report Section 4.5.2.4 (p. 4-7),

"*The greatest difference between water levels in adjacent screens is 25.69 feet between Wells MW25C and MW25D. Water level differences of 10 to 20 feet were measured at six locations (or wells)—between OW3 and OW3B, OW8 and OW8B, MW17B and MW17C, MW20B and MW20C, MW26B and MW26C, and MW27B and MW27C*".

Although not calculated in the RI Report, the vertical head difference between shallow and deep wells represents a downward vertical hydraulic gradient, which for the well pairs listed above ranges from 0.22 to 0.49 ft/ft, as calculated in Table 1.

Table 1. Vertical Hydraulic Gradients in OU2

Well Name	SB	Depth to Screen Top (ft bgs)	Depth to Screen Bottom (ft bgs)	Water Level Elevation (ft msl)	Screen Midpoint Depth (ft bgs)	Delta L (ft)	Delta H (ft)	Vertical Hydraulic Gradient* (ft/ft)
OW3A	2	63	83	133.72	73			
OW3B	3	112	122	120.56	117	44	13.16	0.30
OW8A	2	60.4	80	133.94	70.2			
OW8B	3	116	126	120.96	121	50.8	12.98	0.26
MW17B	4	94	104	95.24	99			
MW17C	6	172	182	77.76	177	78	17.48	0.22
MW20B	4	122	132	74	127			
MW20C	5	180	190	55.5	185	58	18.5	0.32
MW25C	6	140	150	106.01	145			
MW25D	7	194	209	80.32	201.5	56.5	25.69	0.45
MW26B	4	105	120	88.33	112.5			
MW26C	6	145	160	74.86	152.5	40	13.47	0.34
MW27B	4	144	164	62.34	154			
MW27C	5	180	190	47.1	185	31	15.24	0.49

Notes: bgs - below ground surface
msl - mean sea level
L = distance
H = hydraulic head
Data from RI Report Table 4-1
SB - stratigraphic unit number
*Sign convention: +ve downward, -ve upward

These are clearly significant gradients in comparison to the average horizontal hydraulic gradient of 0.0049 ft/ft (RI Report p. 4-8). Recognizing that vertical hydraulic conductivity (K) is likely to be 10 to 100 times lower than the horizontal K, even a 100 times lower vertical K would give a vertical groundwater flux that is on the same order of magnitude as the horizontal flux. Moreover, a vertical K 1000 times lower than the horizontal K would give vertical flux that is 10% of the horizontal flux, which would still result in significant downward movement of contaminant mass due to the very large surface area for vertical flow (surface area of the aquitard) versus the relatively small cross-sectional area of the aquifer for horizontal flow. Consequently, downward plume migration is expected to be significant, and greater than represented in the report.

The observed downward vertical gradients occur between different stratigraphic units at different well clusters, reflecting as noted in the RI Report (p. 4-10) that "*Aquitards are generally not contiguous over OU2…there is no single, continuous aquitard present at OU2*". Where the indicated discontinuities in aquitards occur, the potential for downward vertical migration of contaminants could be substantial. Such discontinuities appear to be common in OU2, and the resulting downward vertical migration of contaminant also appears to be widespread. A particularly good example of this downward migration is observed at MW23, where the very high concentrations observed in MW23C at 160 ft depth could be related to an upgradient discontinuity in the aquitard between stratigraphic units 4-5 and unit 6.

b) The second line of evidence that indicates that contamination is likely deeper than indicated in the RI Report pertains to stratigraphy. The PCE plume at well cluster MW27 extends to well MW27C, which is completed in stratigraphic unit 4. As shown in cross-section C-C', stratigraphic unit 4 dips in the downgradient direction, such that at the location of MW29 the base on this unit is approximately 270 feet deep. Even considering only the horizontal component of groundwater flow in this unit, it is likely that the plume will extend to depths appreciably greater than 200 feet between MW27 and MW29. Unfortunately, the three main wells that the RI Report relies on for downgradient delineation of the plume, MW28, MW29 and MW30, are all completed at depths of 115 feet or less.

The USEPA conceptual model appears to be predicated on the concept that contamination that enters the water table at the Omega site will subsequently migrate in shallow groundwater near the water table for the entire length of the plume, while recognizing that downward vertical migration will occur simultaneously. The USEPA conceptual model does not recognize the concept of a plunging plume, which is very commonly observed at contaminated sites. In a system with significant downward vertical components of flow, areal recharge of 1.5 to 2 inches per year (as quoted in the RI Report based on USGS work), there is no driving force to maintain the plume at shallow depths, in the absence of additional downgradient sources of contamination. Consequently, it is reasonable to expect the downgradient plume to gradually dive below the water table and into deeper groundwater.

The RI Report concludes that "*The PCE plume likely extends to a depth of about 200 feet bgs in the area of the Pioneer wells (west of the downgradient portion of the OU2 plume) where the contaminated groundwater is extracted via the upper screen intervals of the wells*." (RI Report p 5-34) Regarding the Dace 1 well, the RI Report concludes that "*it is not known whether the PCE plume (defined by concentrations greater than the MCL of 5 µg/L) has reached this area*." (RI Report p 5-34). This conclusion is based solely on the February 2010 sampling event, and does not acknowledge that PCE concentration in this well was 13 ug/L as recently as April 7, 2009. In spite of these conclusions, none of the plume maps in the RI Report show the OU2 plume(s) extending to the location of the GSWC Pioneer or Dace 1 wells (the maps do not even include the GSWC well locations on them), presumably because of the absence of a shallow groundwater plume in these locations. There is no compelling reason why a plume in shallow groundwater is required to overlie a deeper plume, as suggested by USEPA to rationalize that the OU2 plume does not extend to the locations of the GSWC Pioneer and Dace 1 wells.

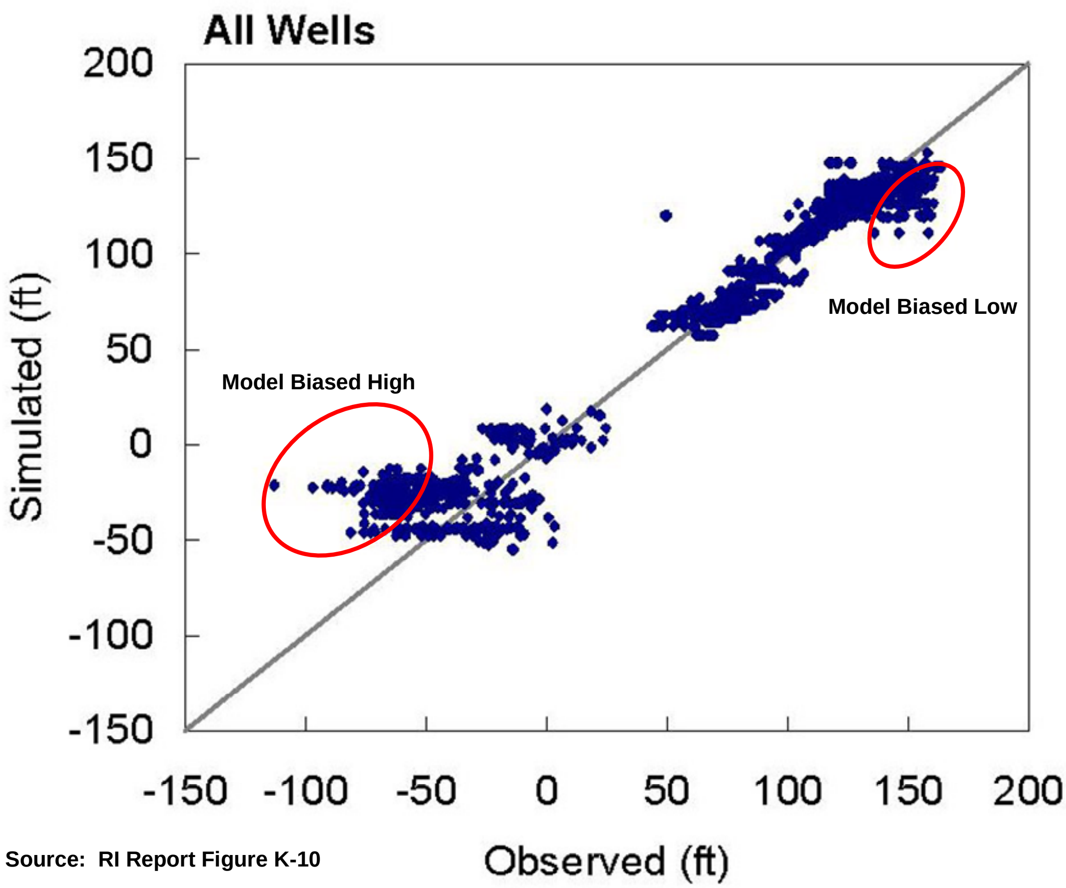
2. Do you think the groundwater modeling work conducted for the RI/FS was valid and adequate? Discuss the weaknesses, if any.

The groundwater flow and transport model developed for the OU2 RI and FS is based on the USGS model of the Central and West Coast Basins (Reichard et al., 2003), with mesh refinement in the OU2 area. The USGS model is a very coarse regional model but it is suitable for providing boundary conditions and flow field beyond the detailed OU2 model area.

Two versions of the OU2 model were developed – an initial version for the RI Report, and a refined version of the model for the FS Report, which includes enhanced calibration using the automated calibration tool PEST, with the pilot point method. Despite numerous shortcomings in terms of the completeness of model documentation (e.g., no water or solute mass balances presented; no tabulations or pumping rates for production wells, etc.) the modeling is generally reasonable. However, several key deficiencies are noted in the comments below, some of which are conceptual model deficiencies carried forward into the numerical simulations.

An important weakness of the RI model is its inability to accurately represent the vertical head differences, and therefore the vertical hydraulic gradient, between the upper stratigraphic units and deeper units in which contamination is observed, particularly stratigraphic units 4 to 6. As noted in the response to Question 1, the difference in groundwater elevation between shallow and deep stratigraphic units is commonly 10 to 20 feet, and these head differences represent significant downward vertical hydraulic gradients. However, there is bias in the RI Model such that simulated groundwater elevations in shallower units with higher groundwater elevations are biased low, while at the same time simulated groundwater elevations in deeper units with lower groundwater elevations are biased high, such that the net effect is a simulation that under-represents the vertical head difference and therefore, the downward vertical gradients (i.e., downward contaminant migration). This bias can be observed in the scatter plot of observed versus simulated heads in Figure K-11 of the RI Report, a portion of which is represented in Figure 1, below:

Figure 1. Scatter Plot of Simulated and Observed Water Levels, Excerpted from RI Report Figure K-10.

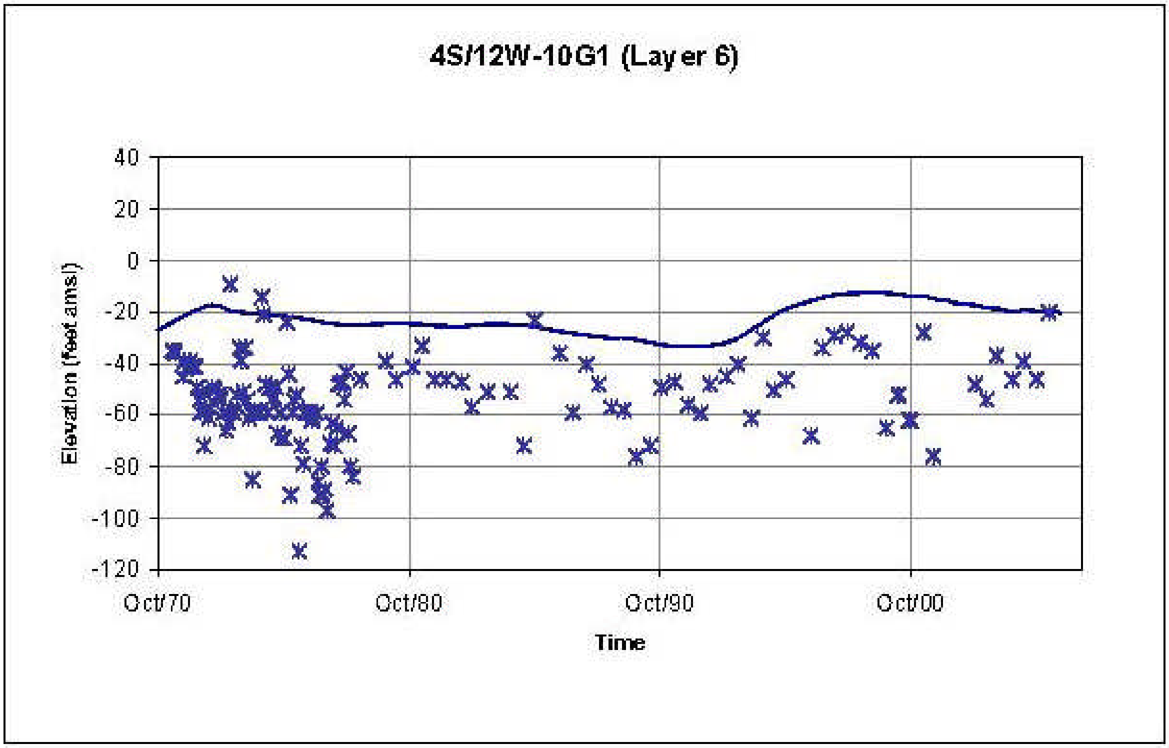


Source: RI Report Figure K-10

As noted in the circled areas in Figure 1, above, the magnitude of the bias in the model is commonly 20 feet or more in the highest and lowest heads in the model, effectively negating any downward vertical gradient.

Another example of the bias in the modeled heads is shown in the transient calibration against observed hydrographs, an example of which is shown in Figure 2 below, from Figure K-12 of the RI Report:

Figure 2. Simulated and Observed Hydrographs, Excerpted from RI Report Figure K-12.



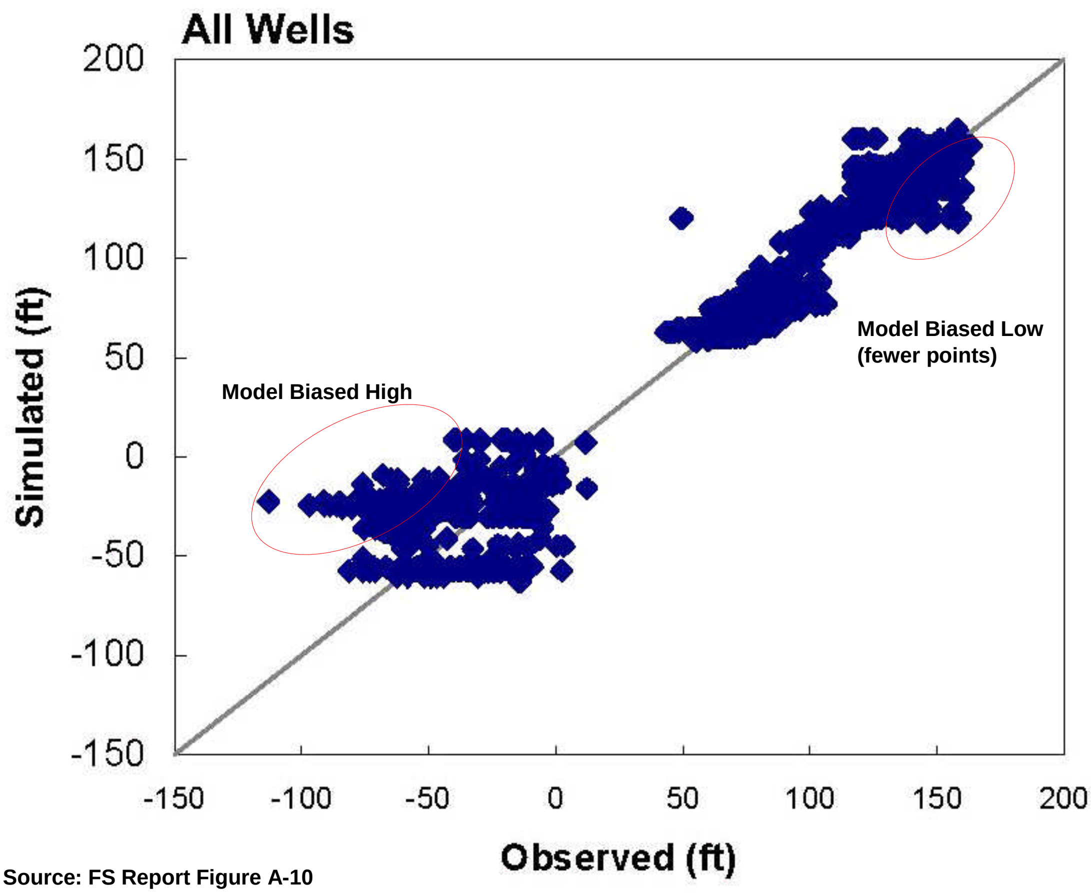
Source: RI Report Figure K-12

The above plot shows that simulated groundwater elevations for a deeper model layer (layer 6; stratigraphic unit 4) are consistently high compared to observed values. Again, the effect of this bias is to underestimate the vertical hydraulic gradient.

Given this bias in the simulated groundwater elevations, it is not surprising that the groundwater model does not adequately simulate downward contaminant migration.

The refined groundwater model of the FS Report shows less bias in the simulated groundwater elevations, although there is still appreciable bias of the same kind shown in the RI model. The scatter plot from Figure A-10 of the FS Report is shown in Figure 3, below:

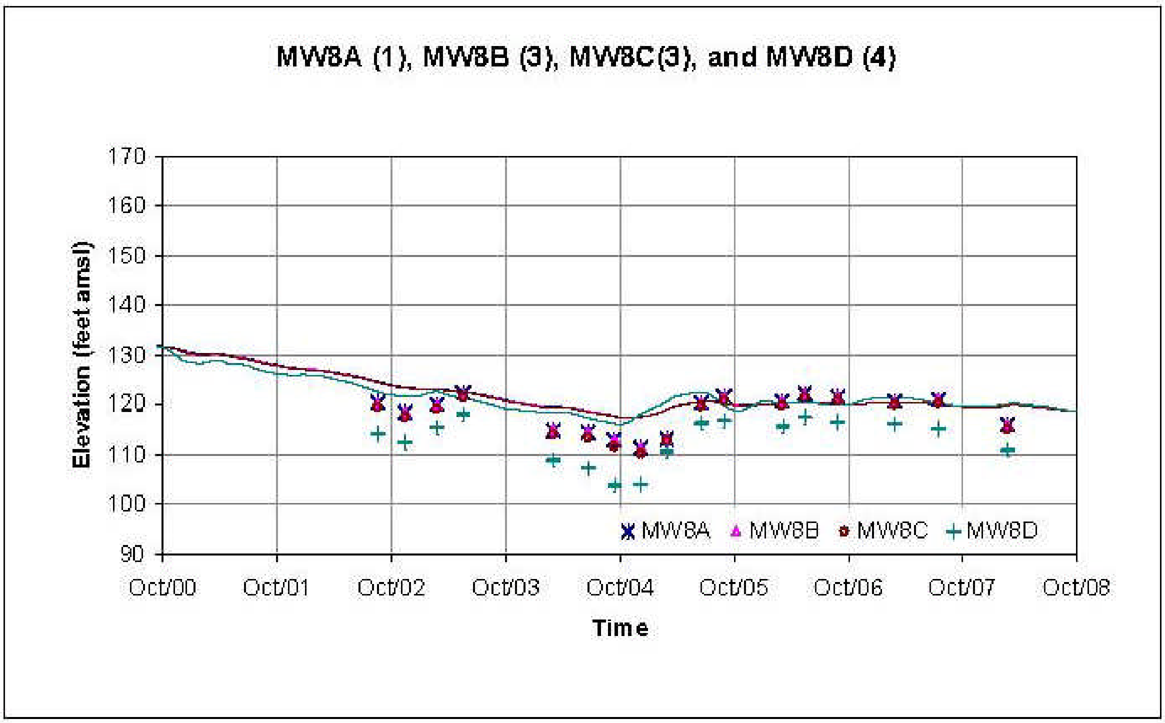
Figure 3. Scatter Plot of Simulated and Observed Water Levels, Excerpted from FS Report Figure A-10



Source: FS Report Figure A-10

Similarly, the transient model hydrograph in the FS model still shows that while groundwater elevations in shallow units are generally well simulated, groundwater elevations in deep units are still simulated high, again under-representing the vertical hydraulic gradient. For example, the following transient calibration hydrograph (Figure 4) is from FS Report Figure A-11:

Figure 4. Simulated and Observed Hydrographs, Excerpted from FS Report Figure A-11.



Source: FS Report Figure A-11

One of the biggest limitations of both models is not with the models themselves, but the conceptual model that is used as their basis. The RI model attempts to match the PCE plume depicted in the RI Report, which incorrectly represents the plume extent in deeper zones (stratigraphic units 4 and 5) and excludes the portion of the plume that extends to the GSWC Pioneer and Dace 1 wells, despite the previously-quoted conclusion of the RI Report that groundwater is extracted via the upper screen intervals of the Pioneer wells (RI Report p 5-34; see Question 1). Since this incorrect plume mapping is the basis for matching in the transport model, the model of course shows that the simulated plume also does not extend to the GSWC wells.

The FS version of the model better represents the vertical differences between shallow and deeper units, and even though it starts with the same incorrect plume extent from the RI conceptual model, the FS simulation results show that the plume is currently captured by the GSWC Pioneer wells. As stated in the FS Report (p. 3-5), "*The modeling indicates that these wells are capturing some of the* *contaminated groundwater from OU2 and currently are providing some degree of the containment at the leading edge.*"

3. Do you agree with the OU-2 plume size depicted in the RI/FS, after reviewing the water quality data from the downgradient Golden State Water Company (GSWC) wells? If not, please tell us how you think the OU-2 plume size should be redrawn? Do you believe the vertical extent of contamination has been adequately addressed?

As discussed in the response to question 1, there is strong evidence for downward vertical groundwater flow and contaminant migration within OU2, and vertical delineation in the downgradient portion of the plume is entirely incomplete. Once contamination has migrated to a deeper stratigraphic unit, the groundwater flow direction in that unit may be naturally different than shallower units, or there may be stresses such as production well pumping, that influence the groundwater flow direction (and plume migration) within the deeper units independently of migration in shallower units. Lowering of groundwater levels in deeper aquifers due to pumping does not only influence (increase) downward vertical migration of contaminants, but also lateral migration within the wells' capture zone. The GSWC Pioneer 1, 2, 3 and Dace 1 wells have screen sections that are likely completed within stratigraphic units 4 and 5 (Wells Pioneer 1: 193-216 ft; Pioneer 2: 196-206 feet upper screen; Pioneer 3: 194-218 ft upper screen; Dace 1: 200-260 upper screen). The furthest downgradient OU2 wells in these units are at MW27, which has (high) concentrations of PCE and TCE of 140 and 120 ug/L, respectively in MW27C, in stratigraphic unit 4. There is no lateral delineation of this contamination in either the downgradient or cross-gradient direction from MW27, so the lateral downgradient extent of contamination in this zone is unknown. This is of particular concern to the southwest and south where the GSWC Pioneer and Dace 1 wells, respectively, are located close to the edge of the plume as mapped by USEPA.

The GSWC Pioneer 1 and 3 and Dace 1 wells had TCE and PCE concentrations exceeding the maximum contaminant level (MCL) of 5 ug/L in the 2005 to 2007 time period (see data tabulated in Question 4 response) that should have been considered by USEPA in drawing the plume outlines for TCE and PCE in the RI Report. The plume outlines in the RI report are composite plume outlines that are supposed to reflect contamination in all the underlying units. The evidence is unequivocal (see response to Question 4) that the GSWC Pioneer and Dace 1 wells were impacted by the OU2 plume at levels greater than the MCL during the time period considered by the RI Report. The plume outline for PCE that are shown in RI Report Figure 1-4 as dashed and characterized as "*potential deep (about 200 feet below ground surface) PCE extent*" should be simply drawn as part of the composite PCE plume outline. Presumably, the same comment also applies to the TCE composite plume. Moreover, downgradient delineation of the deeper zone plume may extend beyond these GSWC wells, and the plume outlines in the RI Report should reflect this uncertainty in the downgradient delineation of the OU2 plumes.

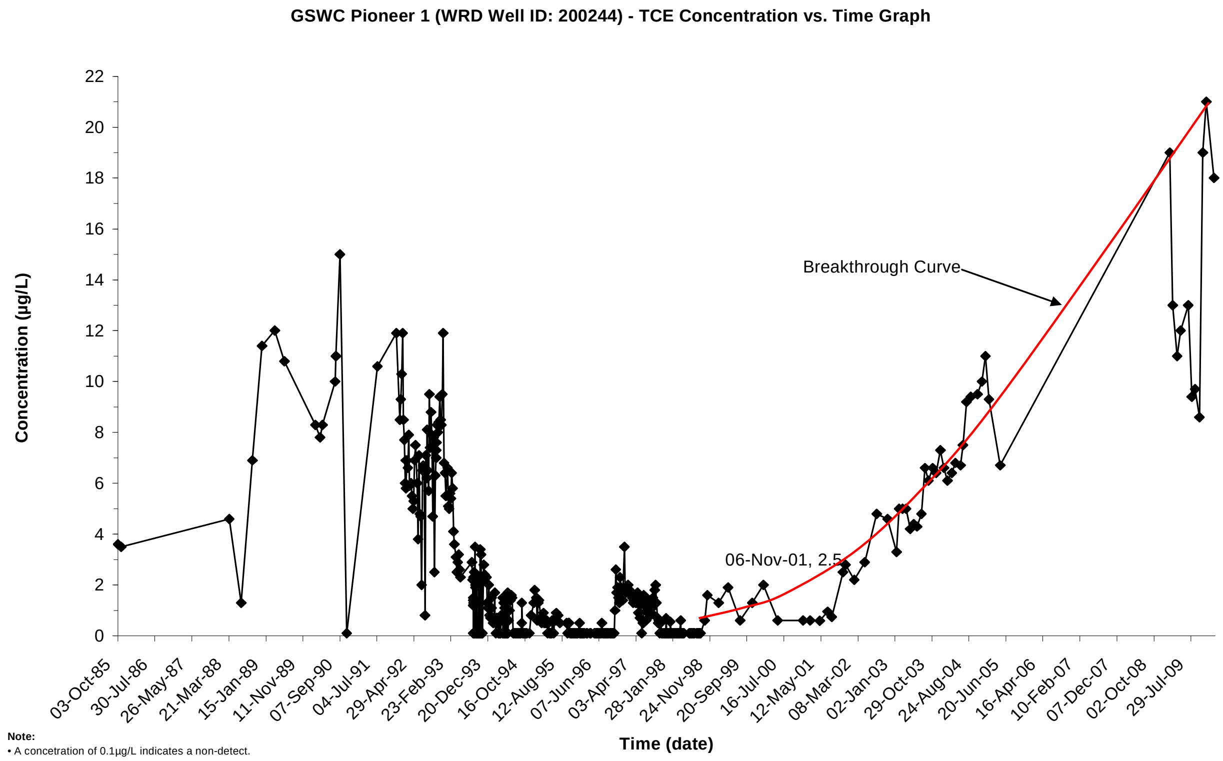
4. Based on your review of the analytical data from the Omega Chemical monitoring wells and the production wells, is it possible that the contaminants detected in the production wells (specifically, GSWC Wells Pioneer 1, 2, & 3, Imperial 1, 2, & 3, and Dace 1) are related to the Omega Chemical site or could the contamination come from a different source? Please discuss.

There is strong evidence to indicate that the GSWC Pioneer wells, and probably the Dace 1 well, have been impacted by contaminants from the Omega Site, and are therefore presently within the limits of the Omega plume, which is only considered as a "potential" by USEPA. First is the suite of contaminants detected at these wells. Considering only compounds that have been detected at least three times (to eliminate anomalies), all of these wells have detected 1,1-Dichloroethene (1,1-DCE) , 1,4 Dioxane, PCE, and TCE. Pioneer 1, 2 and 3 have also detected 1,1,1-Trichloroethane (1,1,1-TCA), and Pioneer 1 has also detected 1,1-Dichloroethane (1,1-DCA). According to the Summary of Sources of Contamination in Table 6-4 of the RI Report, only the former AMK sites in addition to the Omega Site have this full suite of contaminants. In addition, Freon 11 and 113 were also detected at low concentrations (0.5 and 1.2 ug/L, respectively) in GSWC Well Pioneer 1 during the February 2010 sampling by USEPA. These chemicals are considered "... *tracers for the Omega Contaminants because the former Omega facility is the only confirmed source of Freons that have impacted OU2 groundwater*." (FS Report p. 1-11) These constituents were not analyzed as part of GSWC's historical water quality monitoring.

There are nine other sites (listed in Table 6-4) that are sources of PCE, TCE, and 1,1-DCE as found in the Dace 1 well, making its potential source(s) of contamination less unique, but still likely within OU2.

Another line of evidence that contamination in at least the Pioneer wells is from the Omega plume is the observed breakthrough of PCE and TCE at these wells. The breakthrough of TCE in the Pioneer 1 well is shown in the following time series plot (Figure 5):

Figure 5. Time-Series Plot of TCE in the Pioneer 1 Well, Showing Breakthrough Curve for TCE.

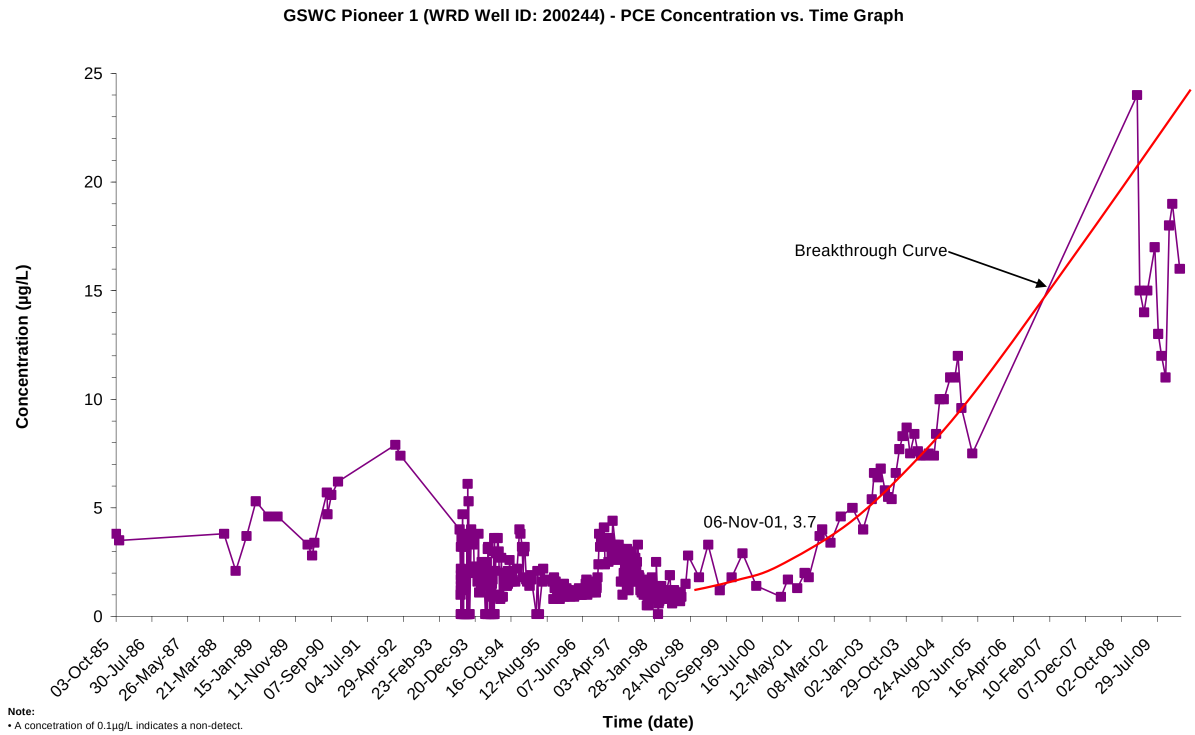


Source: : WRD Database

The breakthrough of TCE in the well begins somewhere between late 1998 and late 2001, but is clearly in progress by November 2001. Pre-mid 1990's TCE appears to reflect a different regional plume that passed through the well from the mid 1980s until about 1996.

A similar pattern of breakthrough is observed for PCE in the Pioneer 1 well, as shown below (Figure 6):

Figure 6. Time-Series Plot of TCE in the Pioneer 1 Well, Showing Breakthrough Curve for PCE.



Source: : WRD Database

This time series graph shows the same breakthrough curve as for TCE, again beginning between late 1998 and late 2001, but clearly in progress by November 2001. These first arrival times represent a theoretical travel time of 22 to 25 years from the start of operations at the Omega and AMK sites in 1976. These travel times therefore correspond to a groundwater velocity for first arrival of TCE and PCE of 800 ft/year to 909 ft/year. Recognizing that first arrival time is appreciably faster than the advective velocity (as noted in the RI Report) and the several times factor of uncertainty in the USEPA's 620 ft/yr average advective velocity, the above travel times are well within reason for a source at the Omega/AMK sites (note that travel time from the AMK Sites would be 11 years less than that from the Omega Site (RI Report p 6-18) at an advective velocity of 620 ft/year).

The TCE and PCE breakthrough curves for Pioneer 3 are very similar to Pioneer 1, but first arrival appears later (December 2003) probably due to dilution of the plume water with water from deeper screened intervals. The breakthrough curves for Pioneer 2 are qualitatively similar to Pioneer 1, but with much more variability, and probably reflecting a different capture zone than Pioneer 1 and 3.

The Dace 1 well also shows a strong breakthrough curve of PCE beginning approximately May 2000. TCE breakthrough is much noisier, but also appears to begin in early to mid 2000. At a distance of approximately 25,000 feet from the Omega site, and first arrival time of 24 years, the first arrival groundwater velocity would be 1040 ft/yr, which is still within the plausible range given the factors noted above.

Finally, the relative proportions of TCE to PCE in the groundwater from the Pioneer wells is consistent with those in the Omega plume. As noted in the RI Report conceptual model discussed in Question1, TCE and PCE degradation processes appear to be slow compared to the rate of plume migration, and therefore it is reasonable to expect the relative concentrations of these to remain relatively constant as the plume migrates, subject to variations in source concentrations and small differences in retardation due to hydrophobic sorption. In Section 5.7.5 of the RI Report, an attempt is made to characterize the relative VOC concentrations in each well. However, the large number of contaminants and sources in OU2 presents a confusing picture. On the other hand, the plumes of PCE and TCE in OU2 present a logical, hydrogeologically consistent and mappable picture of these contaminant plumes. If one were to overlay the TCE plume on the PCE plume, a consistent picture of contaminant migration would be evident. As a simplified proxy for this overlay, consider only the relative concentrations of TCE to PCE in OU2. Table 2 below gives the ratio of TCE to PCE (i.e. TCE/PCE) for the wells shown in cross section C-C’ in Figure 4-8 of the RI Report.

Table 2. TCE/PCE Ratios for Cross Section C-C'

Well	Zone	SB	Depth to Screen Top (ft bgs)	Depth to Screen Bottom (ft bgs)	TCE (ug/L)	PCE (ug/L)	Ratio (TCE/PCE)
MW29	A	3	90	110	4.8	1.8	2.67
MW27	A	3	90	110	200	280	0.71
	B	4	144	164	140	120	1.17
	C	5	180	190	0.39	0.5	0.78
	D	5	200	210	4.5	0.35	12.86
MW20	A	3	75	90	37	28	1.32
	B	4	122	132	19	16	1.19
	C	5	180	190	2.9	0.26	11.15
MW26	A	3	70	90	140	200	0.70
	B	4	105	120	110	150	0.73
	C	6	145	160	95	92	1.03
	D	6	185	205	0.5	0.5	1.00
MW17	A	3	56	71	100	290	0.34
	B	4	94	104	110	80	1.38
	C	6	172	182	9.6	1.1	8.73
MW16	A	3	45	60	1.3	6.1	0.21
	B	5	106	116	18	5.7	3.16
	C	6	149	164	1.2	0.38	3.16
MW25	A	3	45	65	51	97	0.53
	B	4-5	90	110	180	110	1.64
	C	6	140	150	5.1	3.9	1.31
	D	7	194	209	0.5	0.5	1.00
MW23	A	2	35	55	360	810	0.44
	B	3	82	97	18	23	0.78
	C	5	145	160	520	510	1.02
	D	6	175	185	0.58	0.61	0.95
MW4	A	2	42.7	53	200	450	0.44
	B	3	69.7	80	120	440	0.27
	C	3	88.7	99	120	42	2.86
MW15	A	2	50	70	190	520	0.37
MW24	A	2	50	70	82	590	0.14
	B	3	110	125	0.1	0.052	1.92
	C	5	140	160	0.16	0.82	0.20
	D	6	173	178	0.095	0.19	0.50

Note: Wells are ordered from C (downgradient) to C' (upgradient) as presented on cross-section C-C' in RI Report

bgs - below ground surface

SB - Stratigraphic Boundary (unit)

July-Aug 2007 PCE and TCE data from RI Report Figure 4.8

The average TCE/PCE ratio for this transect through the Omega plume is 1.09 (range 0.14 to 3.16), excluding the three outliers from deep wells (MW27D, MW20D and MW17C) that were completed in stratigraphic units 5 and 6. Also, these wells had a much higher proportion of TCE than PCE with concentrations less than 10 ug/L, which possibly reflects a different source. Approximately one-half of the TCE/PCE ratios are less than 1.0.

TCE/PCE ratios for selected GSWC wells are provided in Table 3. Analytical data were selected to correspond as closely as possible to the July-August 2007 dates in the RI Report.

Table 3. Summary of TCE/PCE Ratios for GSWC Wells

Well	Date	TCE (ug/L)	PCE (ug/L)	Ratio (TCE/PCE)
Pioneer 1	5-May-05	6.7	7.5	0.89
Pioneer 1	2-Sep-09	19	24	0.79
Pioneer 2	1-Jul-05	0.8	0.86	0.93
Pioneer 2	9-Feb-09	3.3	4.6	0.72
Pioneer 3	24-Jul-07	9.3	11	0.85
Pioneer 3	6-Aug-07	6.8	7.4	0.92
Dace 1	5-Jun-07	12	6.6	1.82
Dace 1	6-Aug-07	10	4.9	2.04
Imperial 1	8-Aug-06	<0.5	0.85	< 0.59
Imperial 1	5-Mar-09	<0.5	1	< 0.5
Imperial 1	04-Aug-09	2.2	3.1	0.71
Imperial 2	02-May-07	<0.5	<0.5	-
Imperial 2	06-Aug-07	<0.5	<0.5	-
Imperial 2	04-Aug-09	<0.5	<0.5	-
Imperial 3	02-May-07	<0.5	0.69	<0.72
Imperial 3	06-Aug-07	<0.5	0.64	<0.78
Imperial 3	05-Aug-09	2.4	2.9	0.83

Note: Analytical data selected as close as possible to July-August 2007

Source: : WRD Database

TCE/PCE ratios for the Pioneer wells during the periods above ranged from 0.72 to 0.93, and are consistent with the range of values observed in the Omega plume. The TCE/PCE ratios at the Dace 1 well, while showing greater deviation from the average for the Omega plume, are still within the range of observed ratios for the Omega plume and consistent with the ratio in nearby well MW29. The further downgradient Imperial wells did not have TCE in 2007 but it reappeared in 2009, at which time the TCE/PCE ratios in the Imperial 1 and 3 wells were also consistent with those in the OU2 plume.

Consequently, to summarize, there are three lines of evidence that indicate that the contamination at the Pioneer wells, and possibly also the Dace 1 well, is associated with the Omega plume:

a) The suite of contaminants detected at the Pioneer wells is unique to the Omega and AMK sources; at Dace 1 they are consistent with the Omega and AMK sources;

b) The travel time from the Omega Site to the Pioneer and Dace 1 wells, based on observed breakthrough curve first arrival times, are consistent with expected range of advective-dispersive travel times from the Omega/AMK sources;

c) The proportion of TCE to PCE in the Pioneer wells is very similar to the average TCE/PCE ratio in the Omega plume, as would be expected if the contamination in these wells was part of the Omega plume. The TCE/PCE ratio in the Dace 1 well is within the range of values observed in the Omega plume, so an Omega source of this contamination is plausible.

5. Do you believe the selected remediation system discussed in the Proposed Plan is adequate to control vertical and lateral migration of the entire OU-2 plume and prevent the plume from impacting downgradient production wells? If not, please discuss your concerns and how you think the remediation system should be modified.

While the proposed remedial alternatives appear suitable to capture the OU2 plume in the upper aquifer zone, none of the remedial alternatives considered in the FS Report will, or are intended to, control vertical or lateral migration over the entire OU2 plume in the middle and lower portions of the aquifer zone where contamination is observed. In fact, all of the alternatives rely on downgradient production wells, particularly the GSWC Pioneer and possibly Dace1 wells to intercept the OU2 plume in the middle and lower portions of the contaminated zones. The FS Report does not define these “middle” and “lower” aquifer zones in terms of stratigraphic units, model layers, or depth intervals; however, the FS assumes that plume is limited to 200 feet depth, so presumably the upper, middle and lower portion of the aquifer zones reside between the water table and this depth.

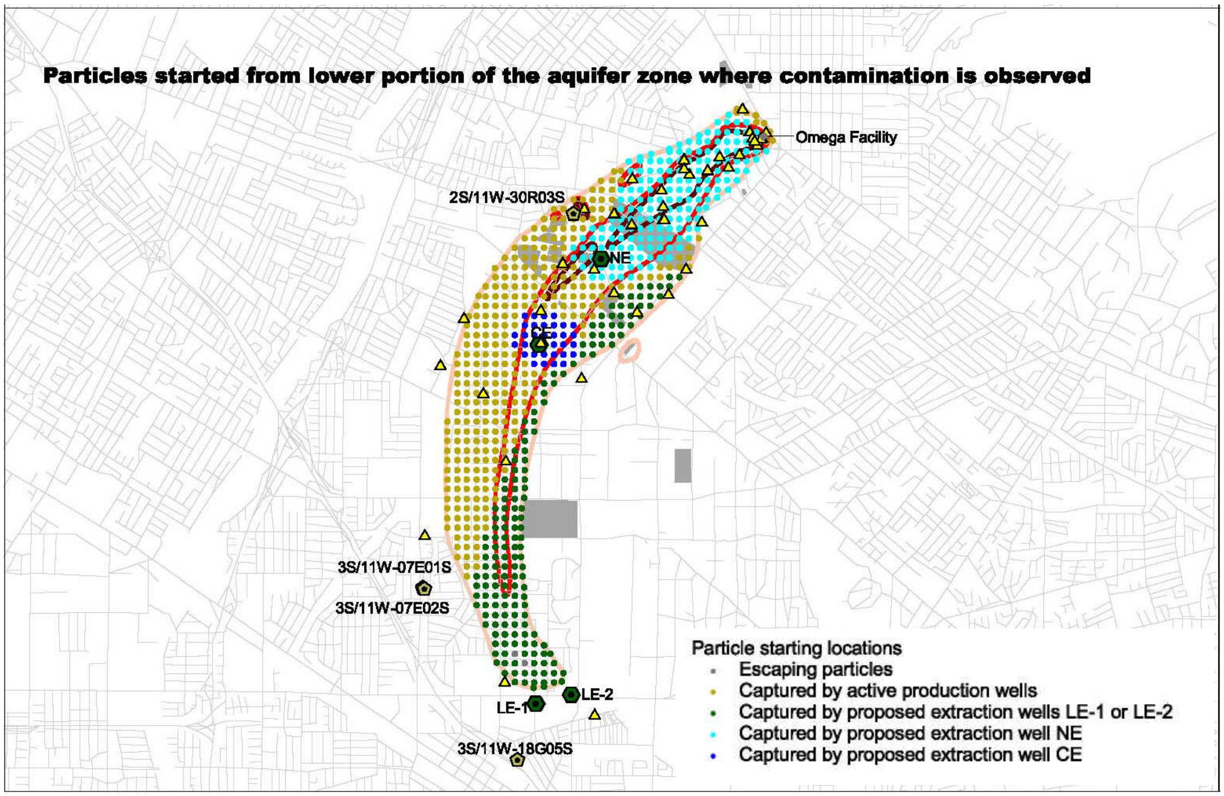
As stated in the FS Report (p. 4-19), “*Under all the alternatives, contaminants would continue to migrate toward those production wells (SFS1 and four GSWC wells) that have already captured part of the OU2 plume (unless those wells are taken out of operation). As a result, the owners of those wells will need to continue to operate the existing wellhead treatment systems indefinitely.”* This conclusion is derived from the FS groundwater flow and transport modeling, which found that *“. . . The modeling conducted to evaluate the pumping scenarios assumed continued operation of these production wells at their currently reported average production rate. Of particular importance are the GSWC Wells Pioneer #1, Pioneer #2, and Pioneer #3, located to the west side of OU2 LE* [leading edge]*. The modeling indicates that these wells are capturing some of the contaminated groundwater from OU2 and currently are providing some degree of the containment at the leading edge. The remedy would have to account for the operation of these production wells…*” (FS Report p. 3-5).

Capture zone modeling conducted for the FS shows that approximately one-third of the OU2 plume in the middle and lower portion of the contaminated zone will continue to be captured by the downgradient GSWC wells. FS Report Figures A-13 and A-14 show the capture zones for the leading edge and plume-wide pumping alternatives, respectively including GSWC wells Pioneer 1 (3S/11W-07E01S), Pioneer 2 (3S/11W-07E02S), and Dace 1 (3S/11W-18G05S). Under both alternatives, these figures show that these three wells will continue to capture the western one-third of the OU2 plume in the middle and lower portion of the contaminated zone.

An example of the capture zone modeling results is shown in Figure 7 for the lower aquifer zone under plume-wide extraction (complete FS Figures A-13 and A-14 are included in Appendix B). All of the yellow-colored particles are captured mainly by the GSWC production wells.

The capture zone modeling indicates that very few particles escape capture by either the extraction wells or production wells, suggesting that either the leading edge or plume wide extraction alternative (including GSWC production wells) should be able to capture the entire OU2 plume.

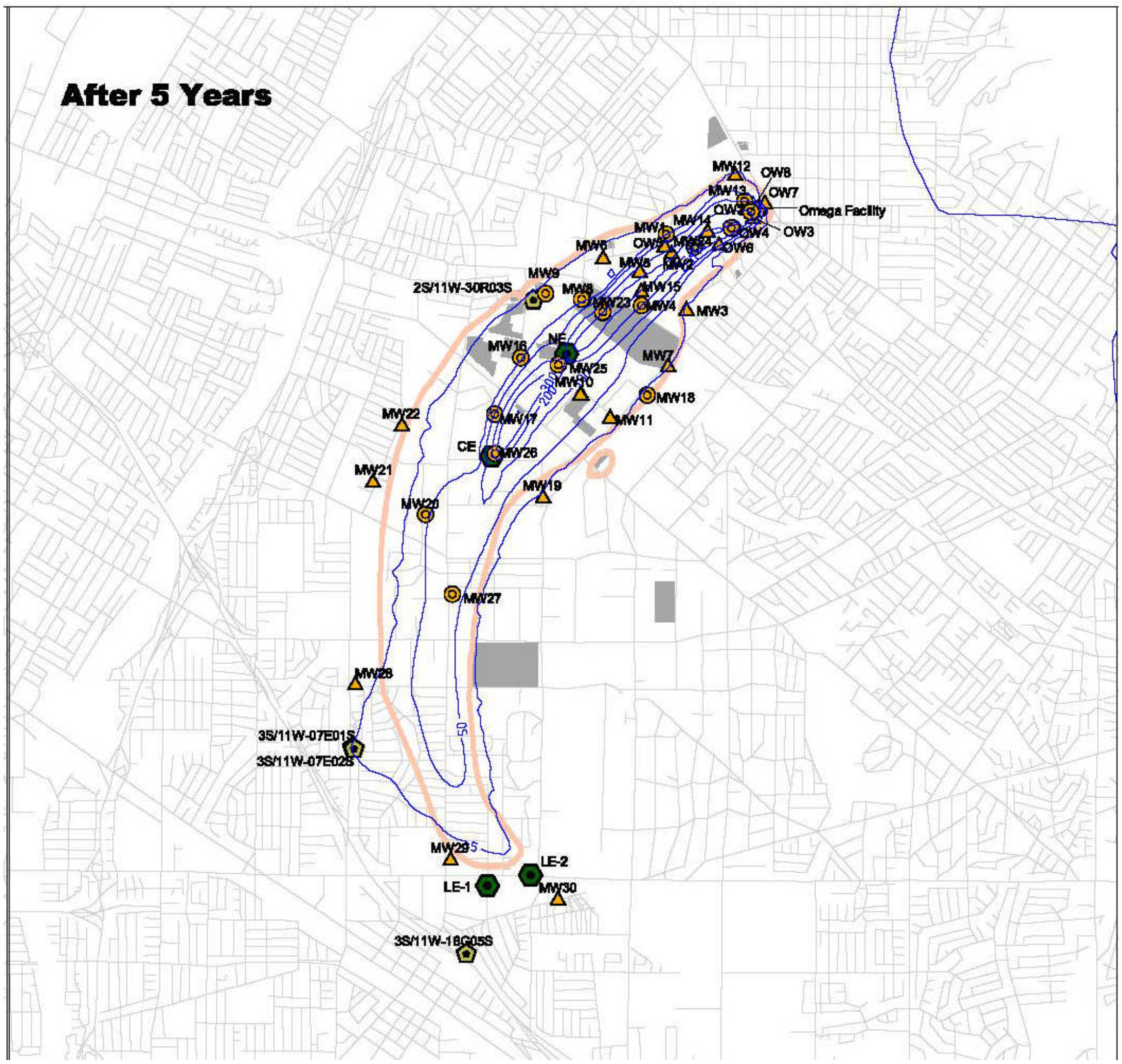
Figure 7. Capture Zone Map, Pumping Scenario with Plume-wide Extraction, Excerpted from FS Report Figure A-14.



Source: FS Report Figure A-14

The capture zone simulations are supported by the solute transport modeling of remedial extraction alternatives (FS Report, Appendix A). The transport modeling shows that for all three remedial alternatives (i.e., no action, leading edge extraction, and plume-wide extraction), the plume in the "Lower Aquifer Zone" (again, terms are not defined in the FS Report) is intercepted by GSWC Pioneer 1 and 2 wells within five years after the start of extraction. In the "Middle Aquifer Zone," the plume is intercepted by Pioneer 1 and 2 wells between 10 and 20 years after the start of extraction. Figures A17-2 and A-17-3 of the FS Report show the transport modeling results for the preferred plume-wide extraction alternative for the Middle and Deep Aquifer zones, respectively. The following Figure 8 shows the modeling results for the Deep Aquifer zone after five years of plume-wide extraction (from Figure A-17-3). Ironically, after five years of remediation extraction under the preferred alternative, the Deep Aquifer Zone plume is being intercepted by the GSWC wells, but not yet by the two leading edge extraction wells. USEPA should consider locating these wells further upgradient, so as to minimize the total volume of clean water pumped before they start to intercept the OU2 plume in excess of MCLs. It would also be appropriate to consider contingency locations (further downgradient) that reflect potential delays in system start-up.

Figure 8. Simulated PCE Plume After 5 Years of Pumping, Lower Aquifer Zone, Plume-wide Extraction Scenario, Excerpted from FS Report Figure A-17-3.



Source: FS Report Figure A-17-3

The proposed remedial alternative, including ongoing extraction from the GSWC Pioneer and Dace 1 production wells is likely to prevent further downgradient migration of the OU2 plume in the groundwater interval up to 200 feet depth. However, as noted previously, there may be significant problems with the USEPA conceptual model in terms of plume depth, particularly in the downgradient portion of the plume (for example, where the proposed leading edge extraction wells are located). The proposed depth of extraction wells in downgradient areas is based on the assumption that the plume is limited to 200 feet depth. However there are no data from this depth (or deeper) and no vertical delineation of the plume in the downgradient areas of concern. Consequently, while in the two-dimensional (plan) view, the proposed remedial alternative appears effective in capturing the entire OU2 plume, but there is a very great risk that a deeper portion of the plume (below 200 ft depth) could bypass the remedial extraction wells and pose an ongoing threat to farther downgradient wells, such as the GSWC Imperial wells (which may already be seeing some leading-edge contamination from the OU2 plume). Additional downgradient plume delineation is required, and if needed, the leading edge extraction wells should be deeper.

In terms of the GSWC Pioneer wells, there is no intention in the USEPA FS to attempt to save these wells from further contamination from the OU2 plume. In fact, it is the clear intent to sacrifice these wells as permanent remediation wells for the OU2 plume. Since these wells are already intercepting the OU2 plume, it may take some time to reverse the impact (for example, by installing additional remedial extraction wells upgradient of the Pioneer wells toward the western side of the OU2 plume). The potential also exists, however, that such remedial extraction could affect the water availability to the GSWC wells. In any case, both the effectiveness of plume interception and the affect on GSWC well yield could be evaluated using the FS groundwater flow and transport model. In terms of the Dace 1 well, the proposed leading edge extraction appears to provide plume interception for this well, although it may take several years for existing concentrations to be reduced. This comment also carries the caveat regarding the proposed extraction well depth versus possible deeper contaminant plume as discussed above.

6. All the downgradient GSWC wells will continue to pump once the remediation system discussed in the Proposed Plan begins operating. Can this affect the effectiveness of remediation activities? If so, how? Provide details.

As noted in the response to question 5, the USEPA's preferred remedial alternative depends on ongoing pumping of the GSWC Pioneer wells, probably indefinitely. Dace 1 well pumping is also considered in the groundwater flow model, and pumping from the Imperial wells is also understood to be included via the original USGS Central Basin model. In other words, ongoing pumping of GSWC's downgradient wells has been considered in the USEPA's proposed remedial plan, and should not affect the remedial implementation unless GSWC changes its pumping patterns appreciably. This comment is subject to the limitation in USEPA's conceptual model and numerical models, as previously discussed.

The proposed remedial plan is based on continued pumping from the GSWC Pioneer wells (1 and 2, at least) at their historic average rates. The GSWC Pioneer wells are an integral part of USEPA's remedial plan, and therefore the effectiveness of remediation could only be affected if these wells were to reduce or cease pumping. In this case, it would be likely that control of the western portion of the OU2 plume would be lost.

One aspect of USEPA's reliance on continued GSWC's pumping and treatment as an integral part of OU2 remediation that is not addressed in the FS Report arises from the question, "What happens if OU2 contaminants that are not amenable to treatment with GSWC's existing system reach the Pioneer wells at level exceeding drinking water criteria?" Of particular concern is 1,4-Dioxane which is already present in the Pioneer wells at concentrations exceeding the 3 ug/L Notification Level.

CLOSURE

The scope of this review was limited to those portions of the documents provided that were deemed necessary to address the questions presented by the WRD. We did not undertake a comprehensive review of all of the documentation provided. Nonetheless, we trust these comments are helpful to WRD in providing a response to USEPA's proposed remediation plans for the Omega OU2 plume. Should you have any questions or concerns, please contact the undersigned at (310) 547-6357 or by e-mail at mark.trudell@worleyparsons.com.

Sincerely,
WorleyParsons

Mark Trudell, Ph.D., PG, CHG
Principal Hydrogeologist

Steve Winners, PE
Principal Environmental Engineer

REFERENCE

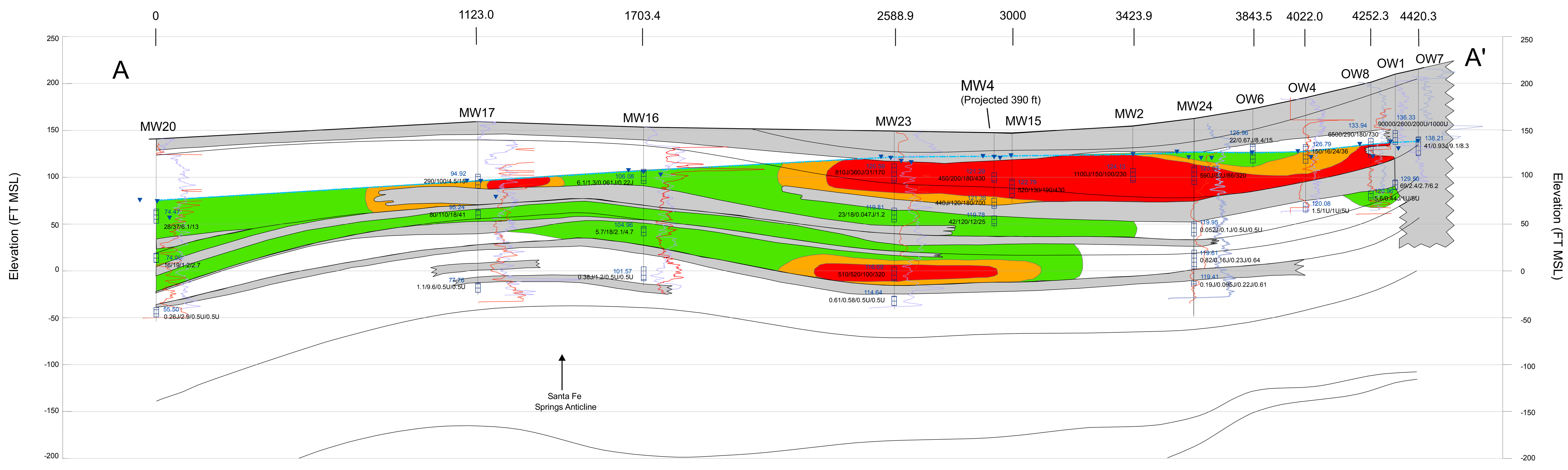
Reichard, E.G., M. Land, S.M. Crawford, T. Johnson, R.R. Everett, T.V. Kulshan, D.J. Ponti, K.J. Halford, T.A. Johnson, K.S. Paybins, and T. Nishikawa. 2003. "Geohydrology, Geochemistry, and Ground-Water Simulation – Optimization of the Central and West Coast Basins, Los Angeles County, California." Water Resources Investigations Report 03-4065. U.S. Geological Survey.

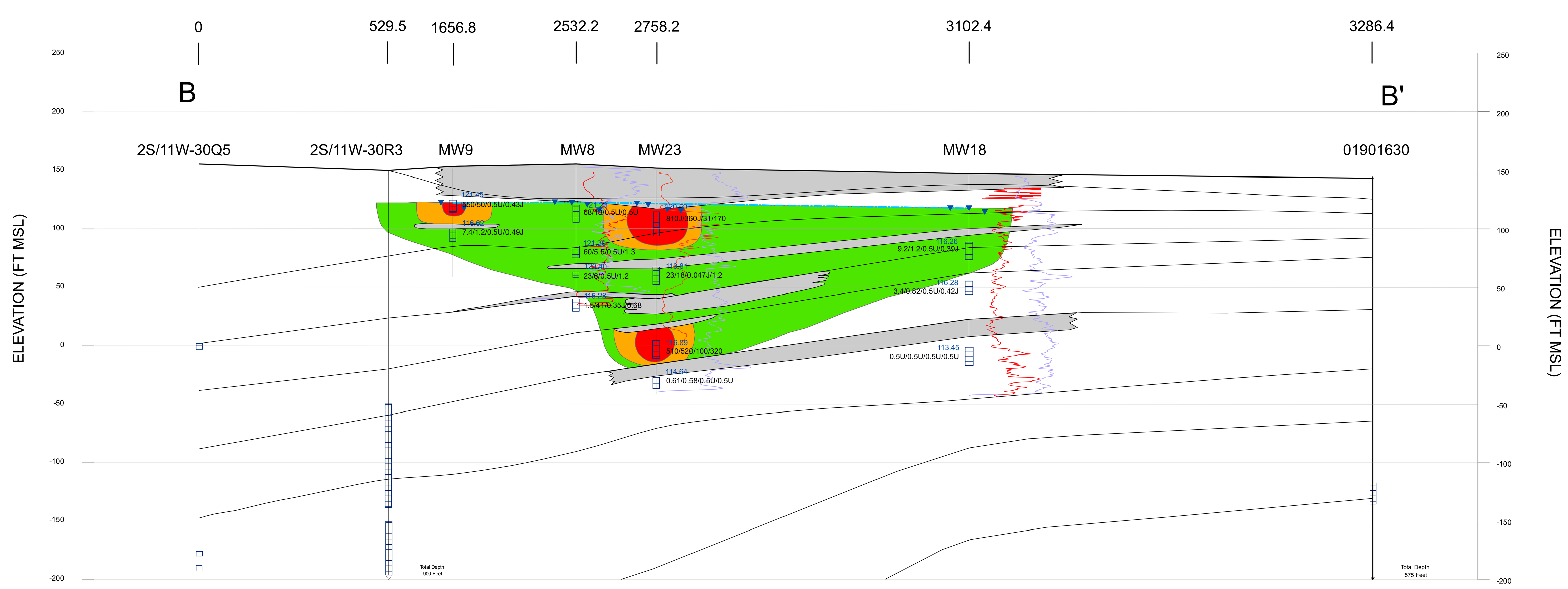
WorleyParsons

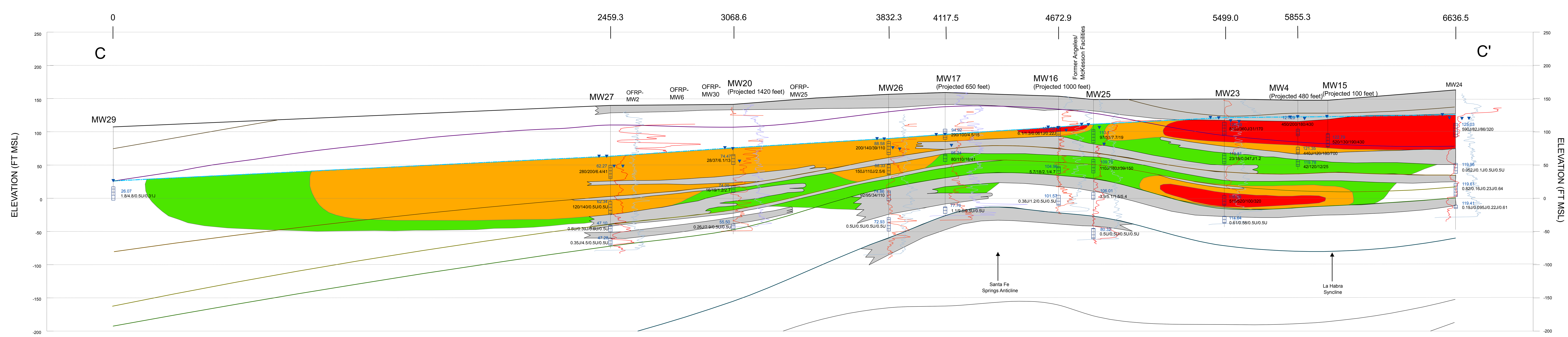
resources & energy

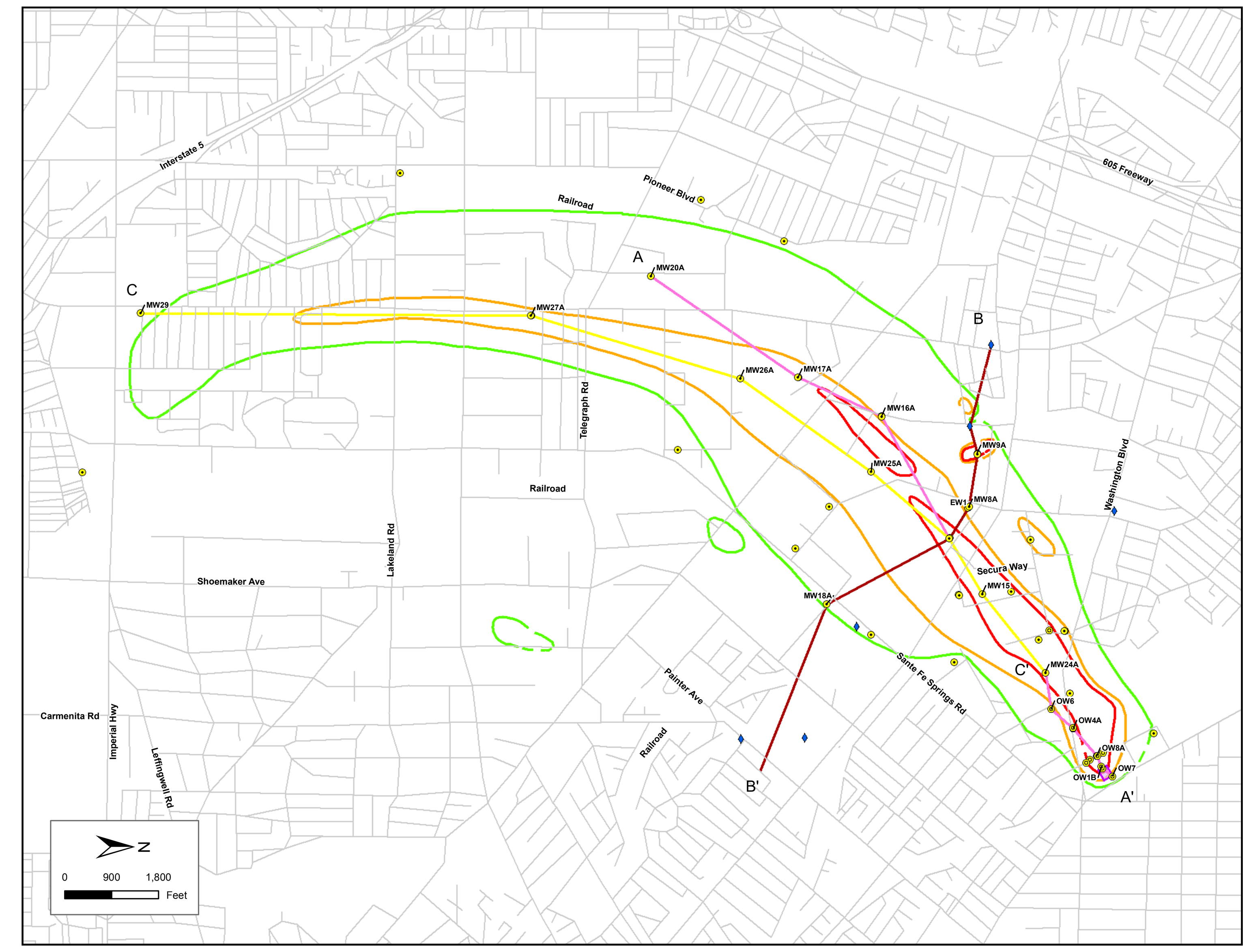
ATTACHMENT A

CITED FIGURES, RI REPORT









Legend

Cross Sections

Geophysical Logs
- Gamma
- Resistivity
- Fine-Grained Unit

Water Level
- Water Level Elevation (ft msl)
- Water Table
- Stratigraphic Boundaries

Composite PCE Distribution
- > 5 ug/L
- > 100 ug/L
- > 500 ug/L

Concentration
120.25 Water Level
0.61/0.58/0.5U/0.5U = PCE/TCE/Freon 11/Freon 113 collected in July-August 2007

Cross Section Location Map

- EPA Monitoring Well (July 2007)
- Omega Potentially Responsible Parties Organized Group (OPOG) Monitoring Well (August 2007)
- Production Well

Cross Section
- AA'
- BB'
- CC'

Composite PCE Plume Extent
- 5 ug/L (Dashed where Approximate)
- 100 ug/L (Dashed where Approximate)
- 500 ug/L (Dashed where Approximate)
- Former Omega Facility

Notes:
1) PCE = Tetrachloroethene
2) TCE = Trichloroethene
3) F11 = Freon 11
4) F113 = Freon 113
5) U = Non-Detect; J = Estimated Value; R = Rejected Value
6) SB - Stratigraphic Boundary
7) FT MSL = Feet Above Mean Sea Level
8) Smooth (finger-like) lateral termination of fine-grained units represents facies change into coarse-grained material. Jagged termination is used when extent is unknown.
9) Stratigraphic interpretation is also based on deep seismic reflection data (not shown)

Figure 4-8
Hydrogeologic Cross Sections with Location Map
Omega Chemical Superfund Site

CH2MHILL

Date: May 30, 2008

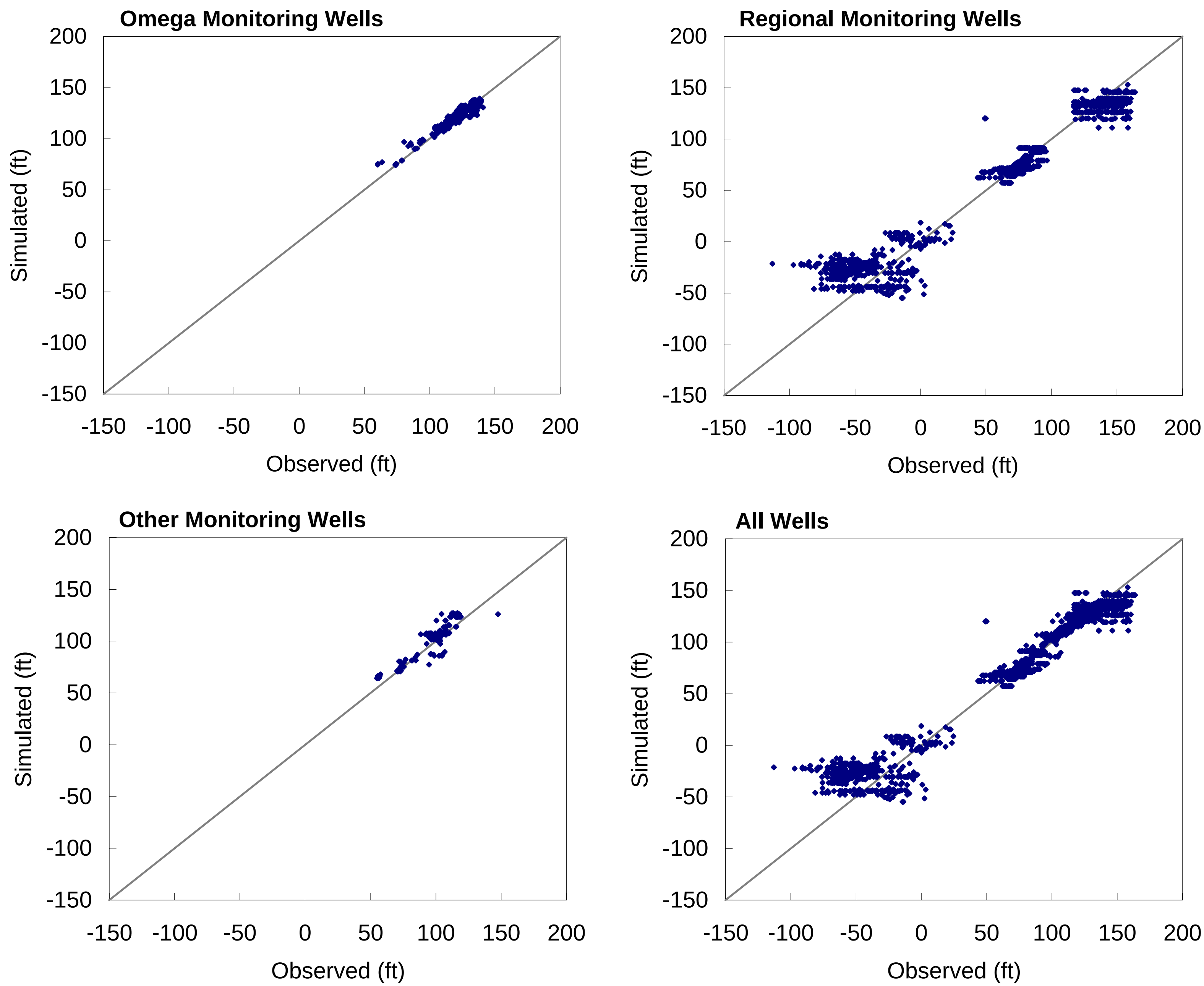


Figure K-11. Scatter Plots of Simulated and Observed Water Levels

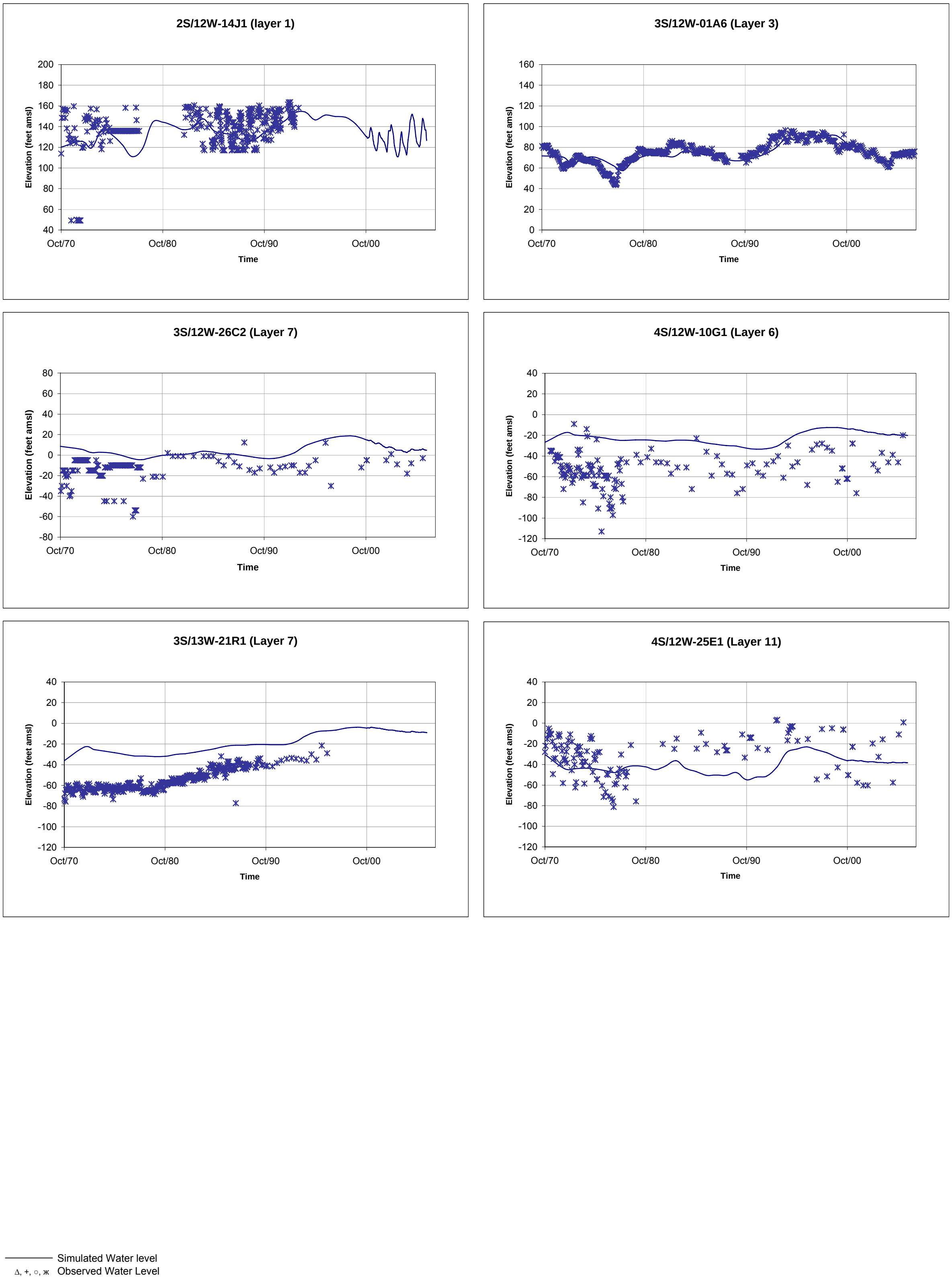


Figure K-12

Simulated and Observed Hydrographs

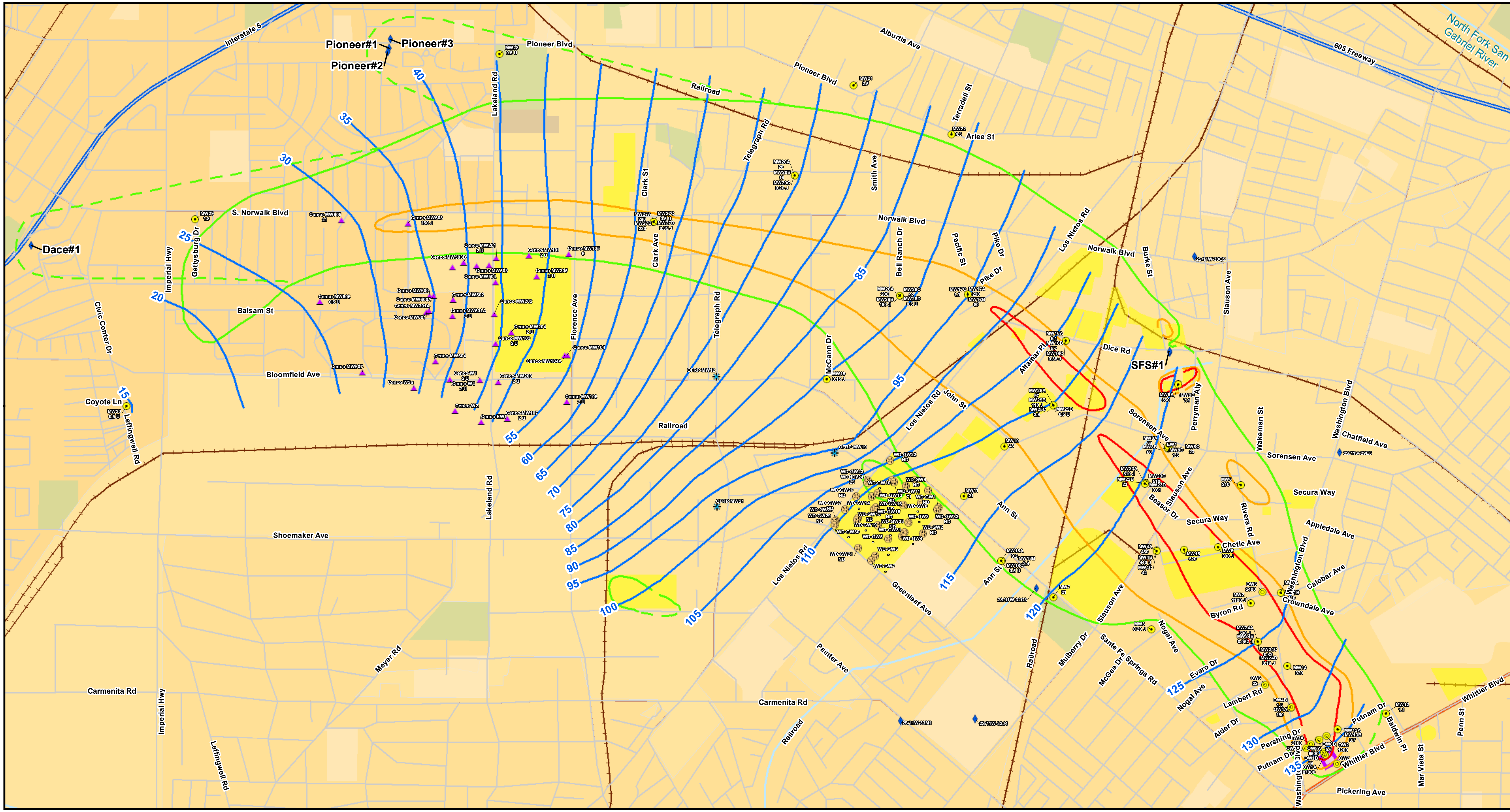
Regional Monitoring

WorleyParsons

resources & energy

ATTACHMENT B

CITED FIGURES, FS REPORT



Legend

- EPA Monitoring Well (July 2007)
- Omega Potentially Responsible Parties Organized Group (OPOG) Monitoring Well (August 2007)
- Oil Field Reclamation Project (OFRP) Well
- Waste Disposal, Inc. (WDI) Well (4th Quarter, 2002)
- Active Production Well (Locations shown are approximate)
- CENCO Wells (August - November 2006)
- Approximate Boundary of Facilities
- Former Omega Facility

Composite PCE Plume Extent, July 2007

- 5 ug/L
- 100 ug/L
- 500 ug/L
- Potential deep (about 200 feet below ground surface) PCE extent
- Water Level Contours 2007

N

0 1,600 3,200 Feet

Notes: 1) J - Estimated Value upper level of instrument calibration range. 2) U - Non-Detect 3) E - Estimated value as the concentration exceen upper level of instrument calibration range. 4) NS - Not Sampled

\\GALT\PROJ\OMEGA\2010\MAPFILES\11X17_PCE_V2.MXD DDODS

Figure 1-4
Composite PCE Distribution
Omega OU2 Feasibility Study

CH2MHILL

Date: May 5, 2010

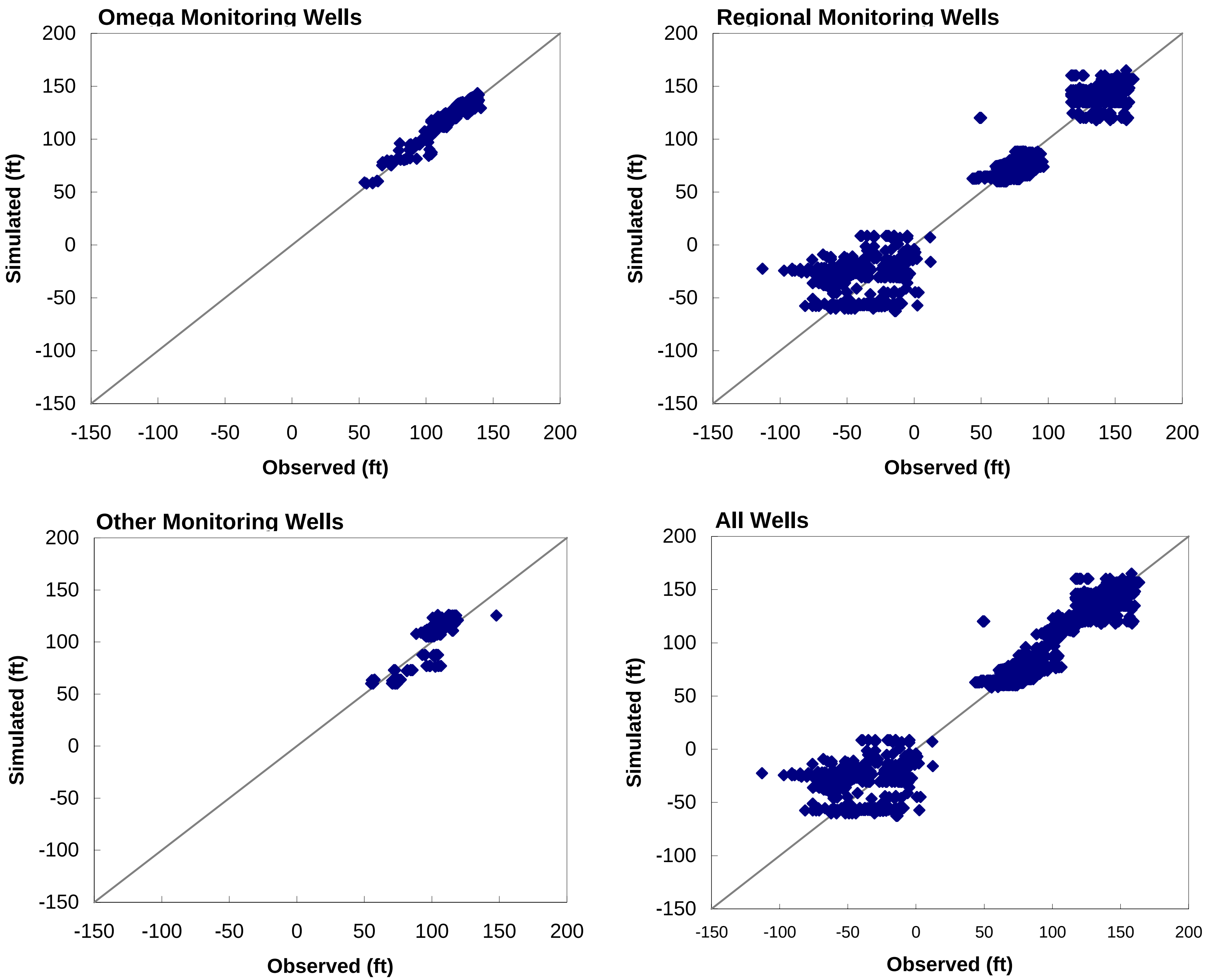
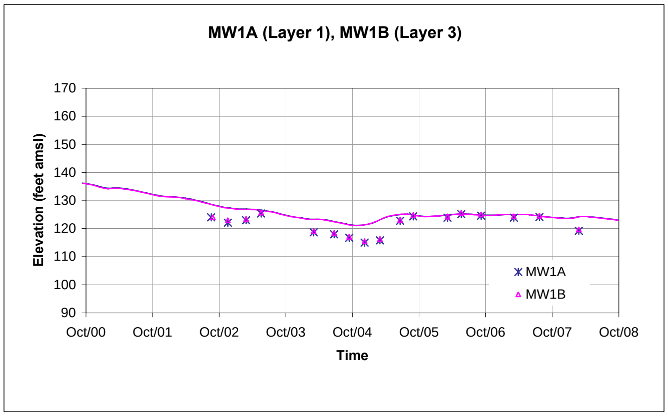
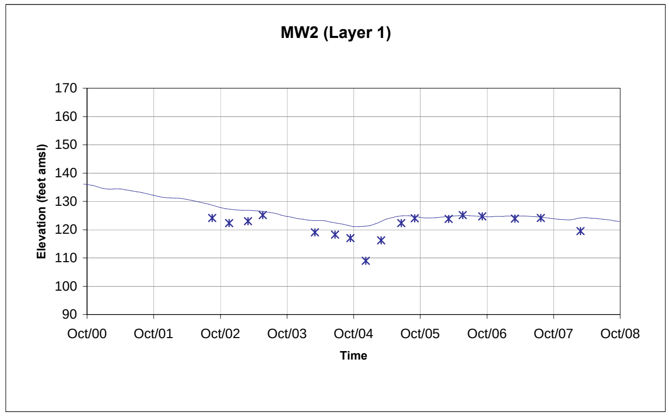


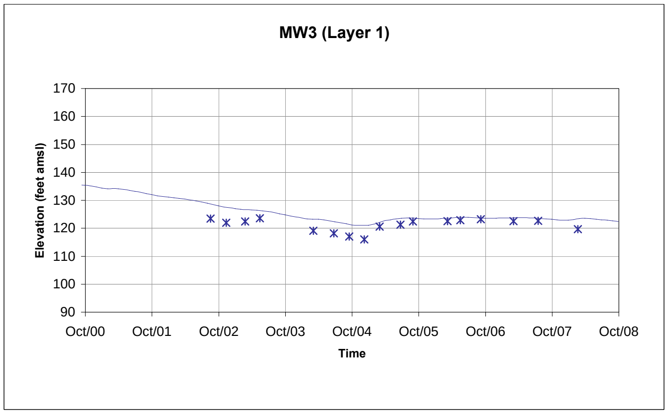
Figure A-10

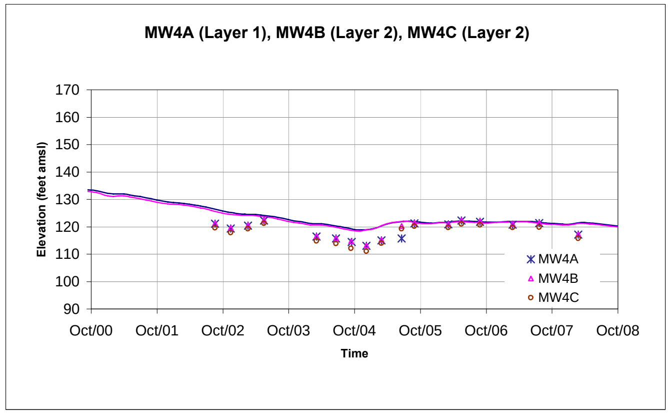
Scatter Plots of Simulated and Measured Water Levels, Transient Model Simulation

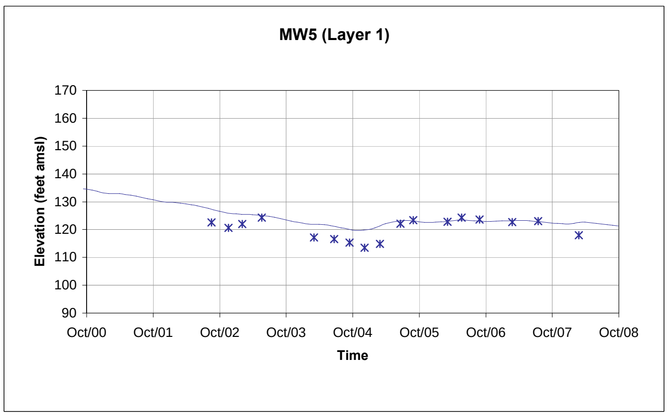
Omega OU2 Feasibility Study

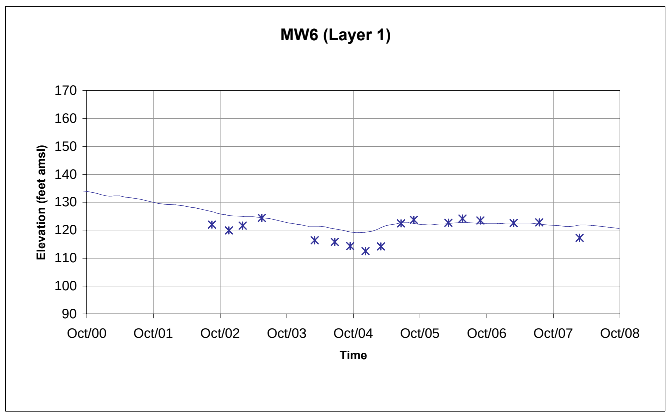


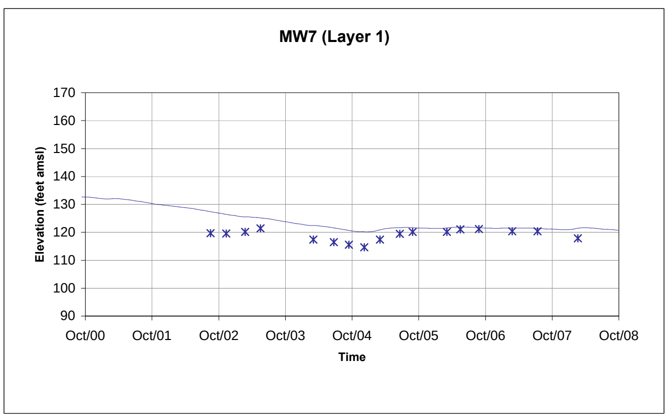












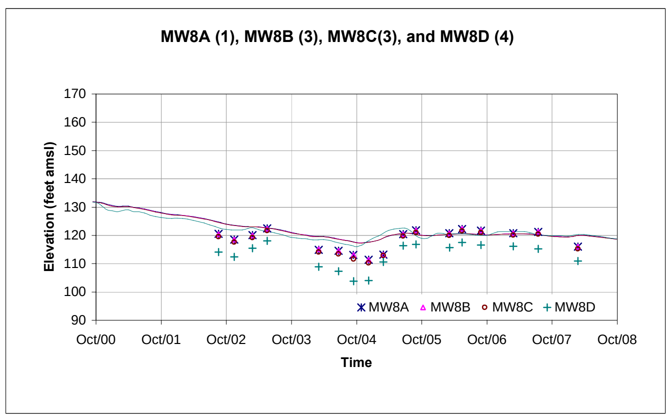


Figure A-11

Hydrographs - Simulated vs Observed

Omega OU2 Feasibility Study

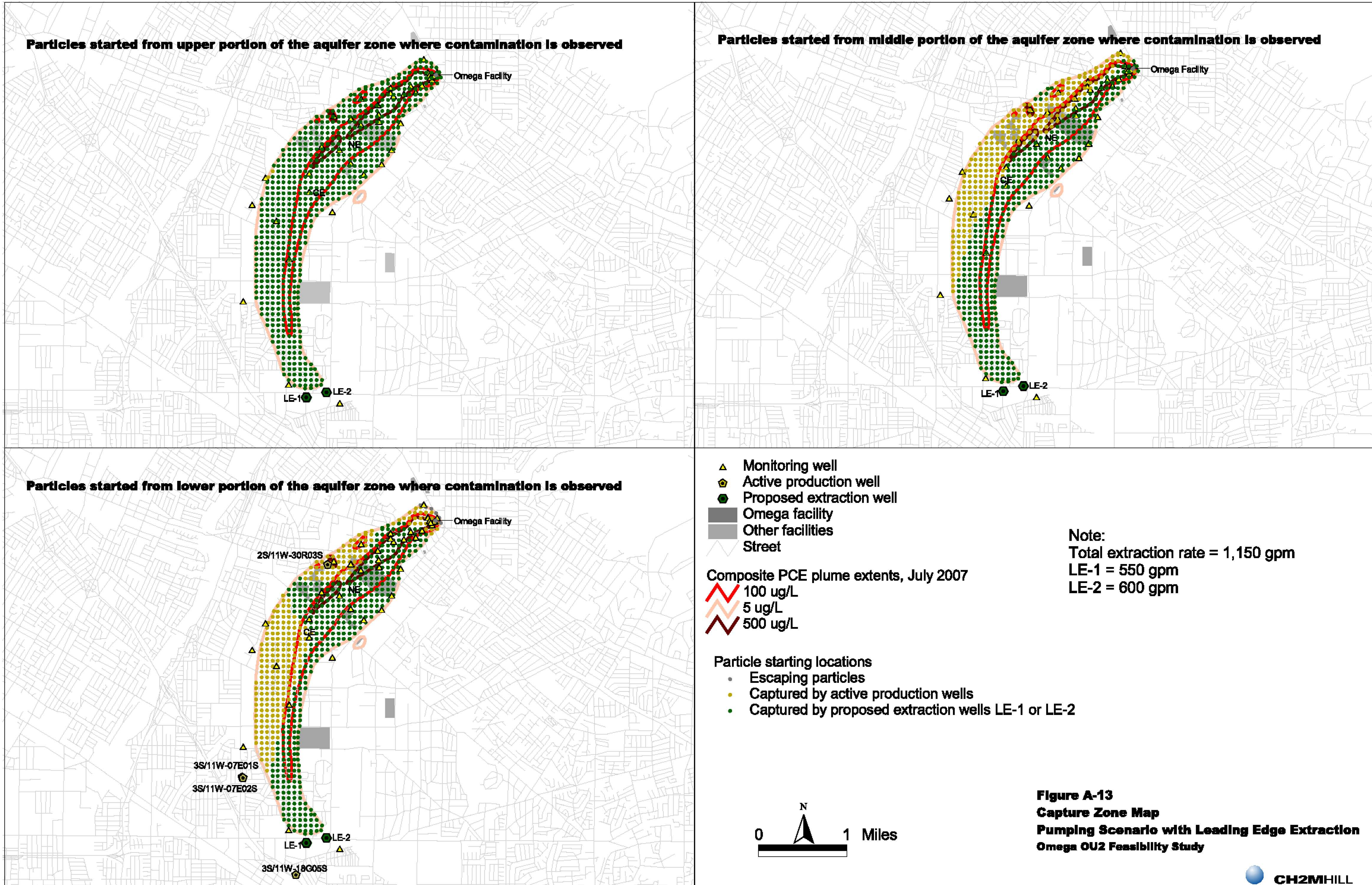


Figure A-13
Capture Zone Map
Pumping Scenario with Leading Edge Extraction
Omega OU2 Feasibility Study

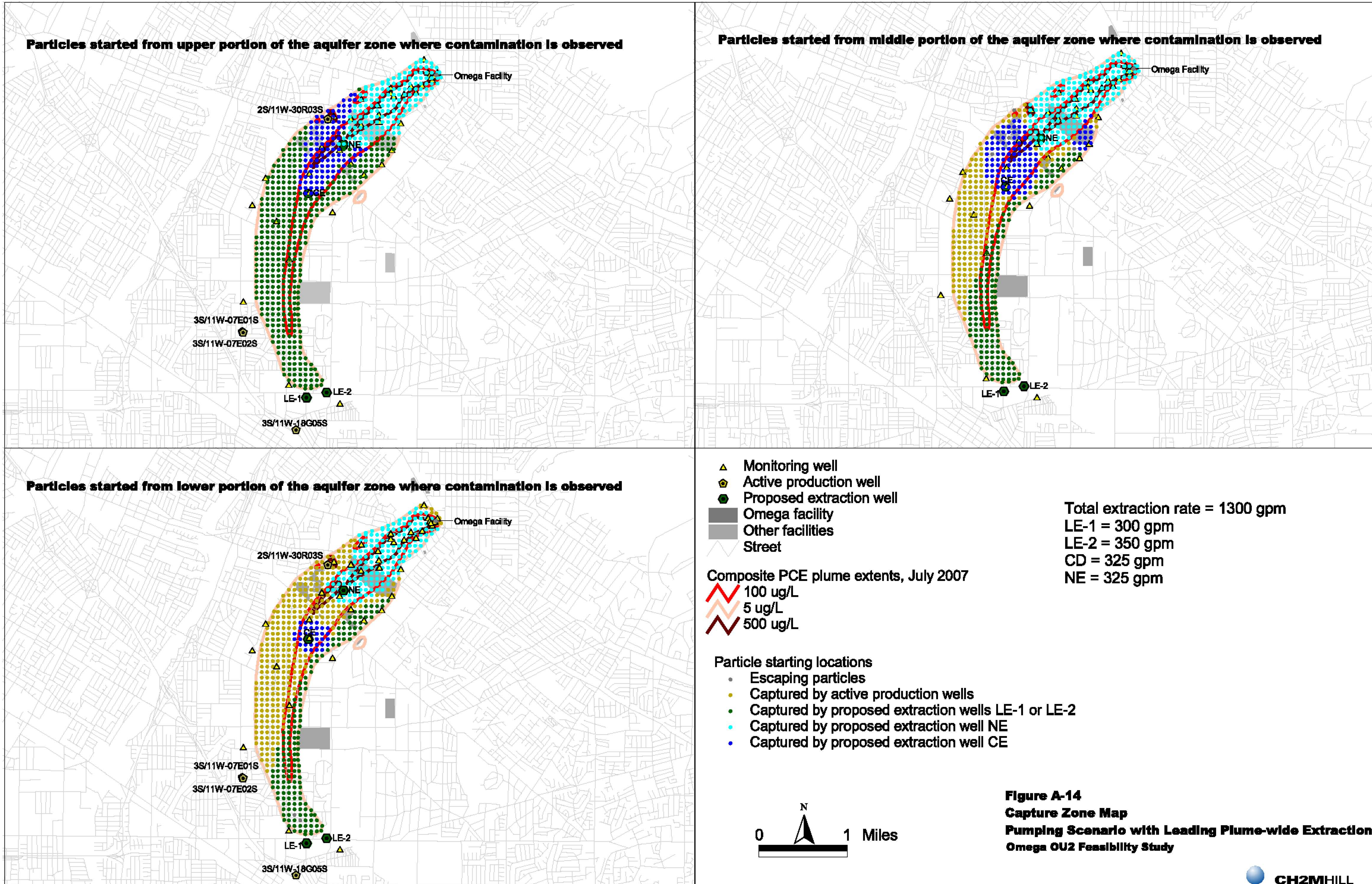


Figure A-14
Capture Zone Map
Pumping Scenario with Leading Plume-wide Extraction
Omega OU2 Feasibility Study

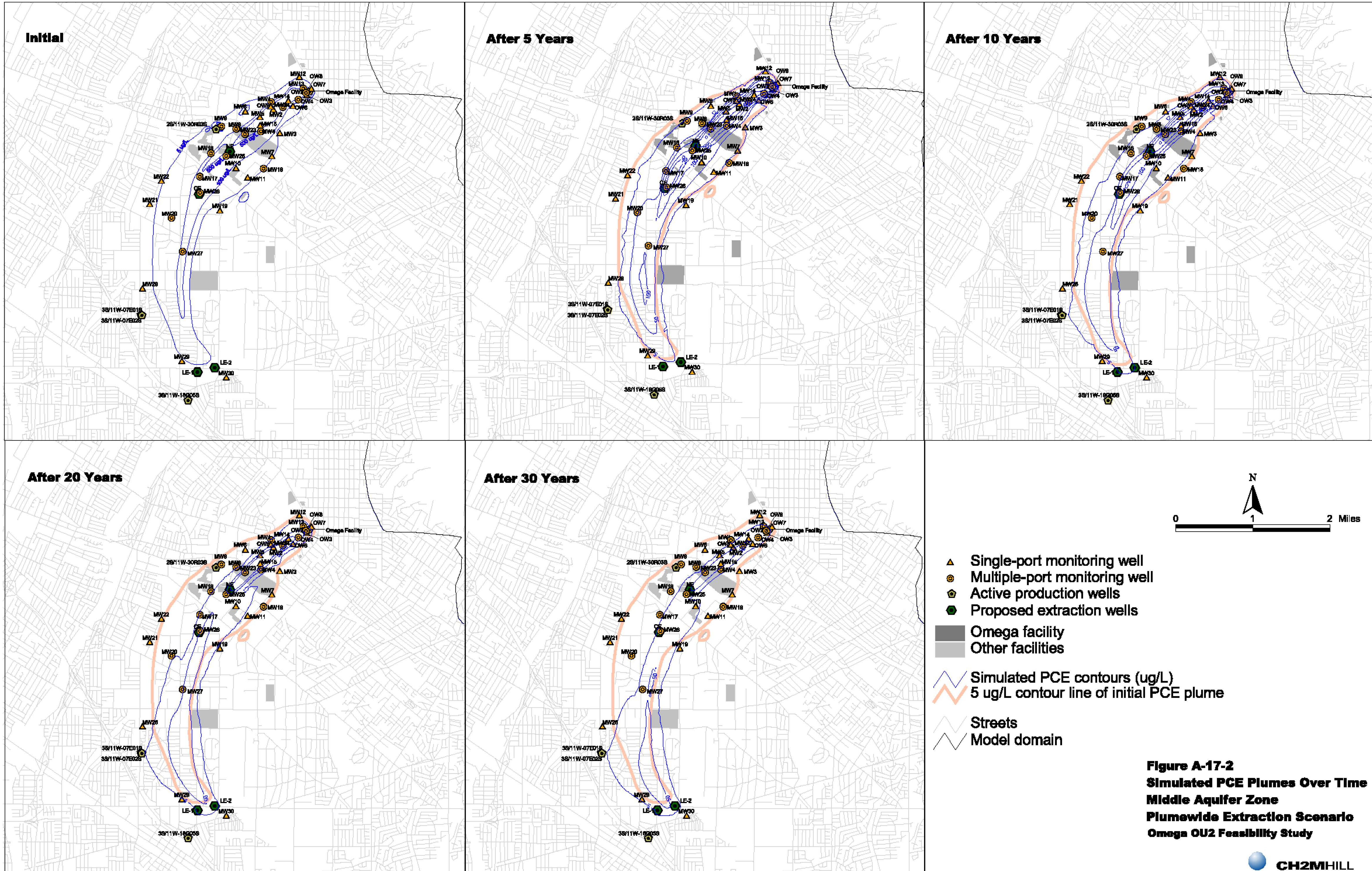


Figure A-17-2
Simulated PCE Plumes Over Time
Middle Aquifer Zone
Plumewide Extraction Scenario
Omega OU2 Feasibility Study

CH2MHILL

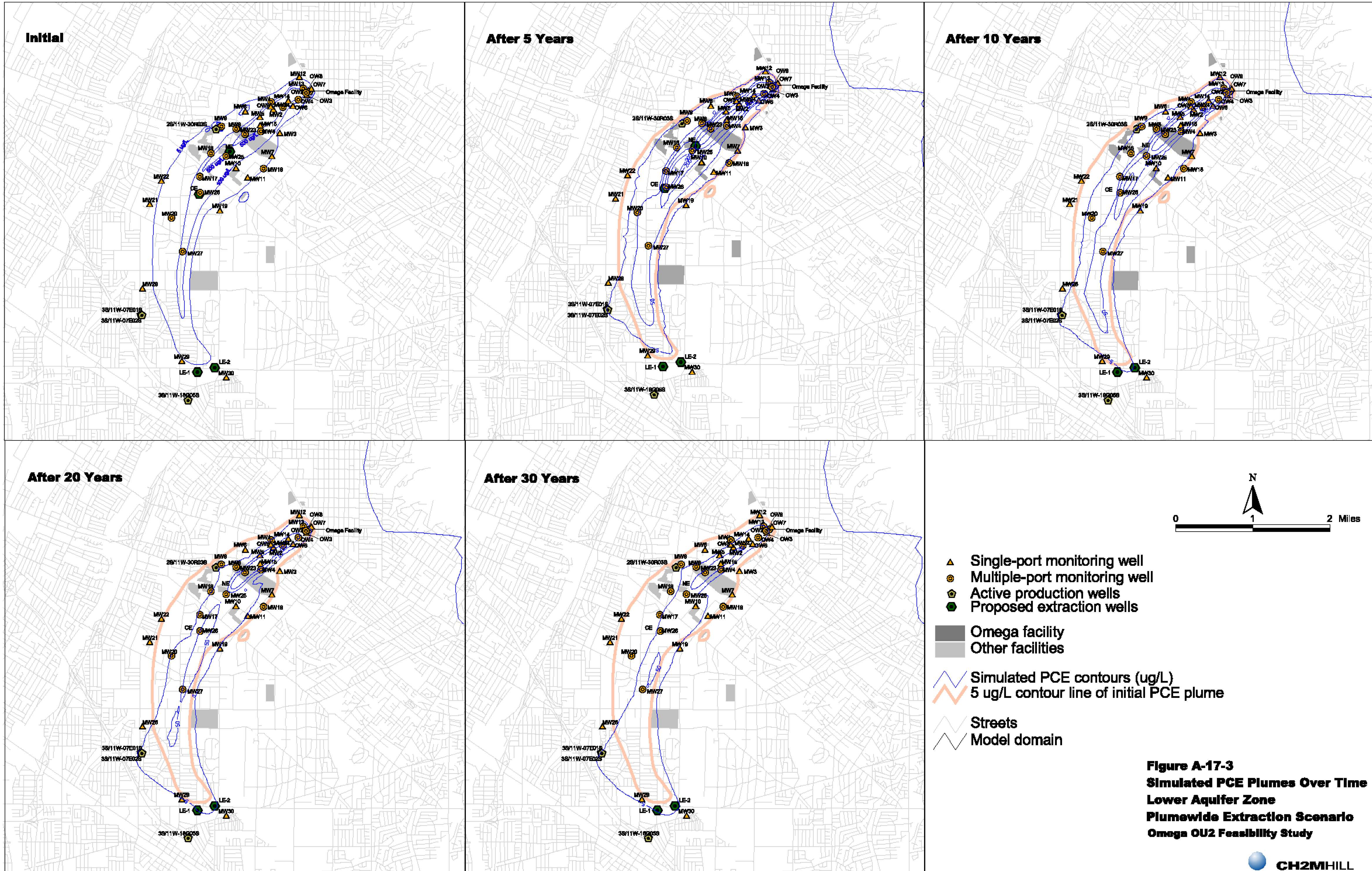


Figure A-17-3
Simulated PCE Plumes Over Time
Lower Aquifer Zone
Plumewide Extraction Scenario
Omega OU2 Feasibility Study